

**COMPUTERWORLD**

# CLIENT/SERVER

AUGUST 11, 1993

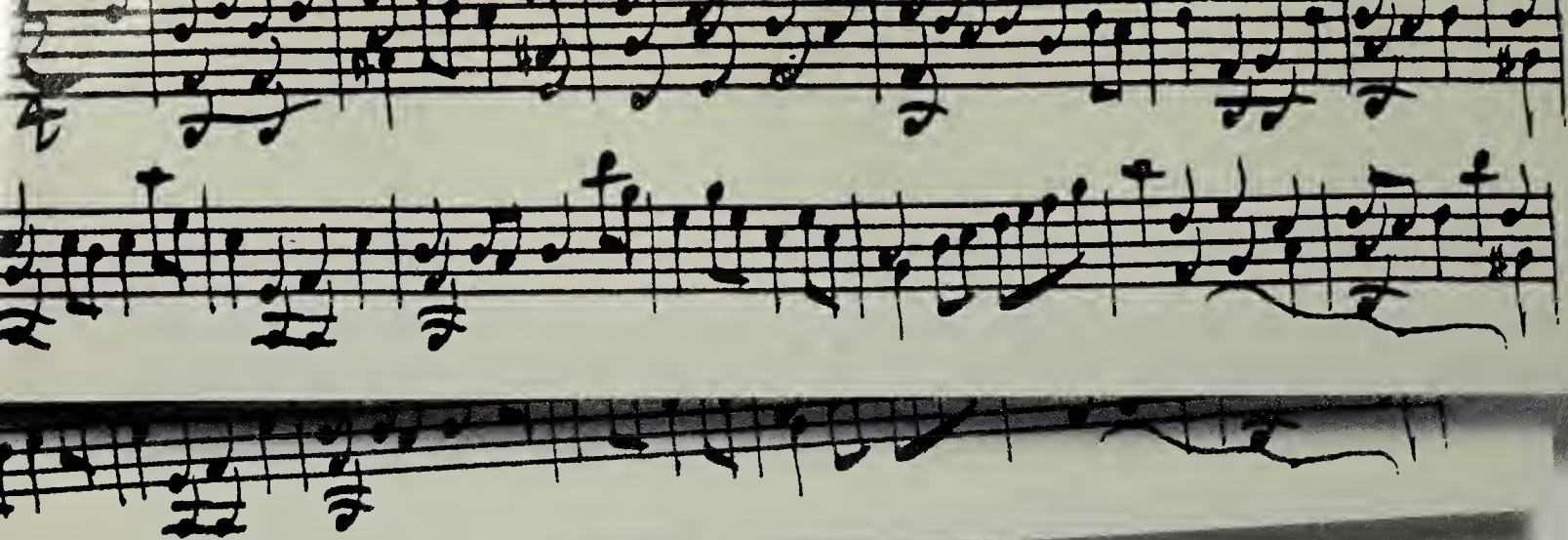
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JOURNAL

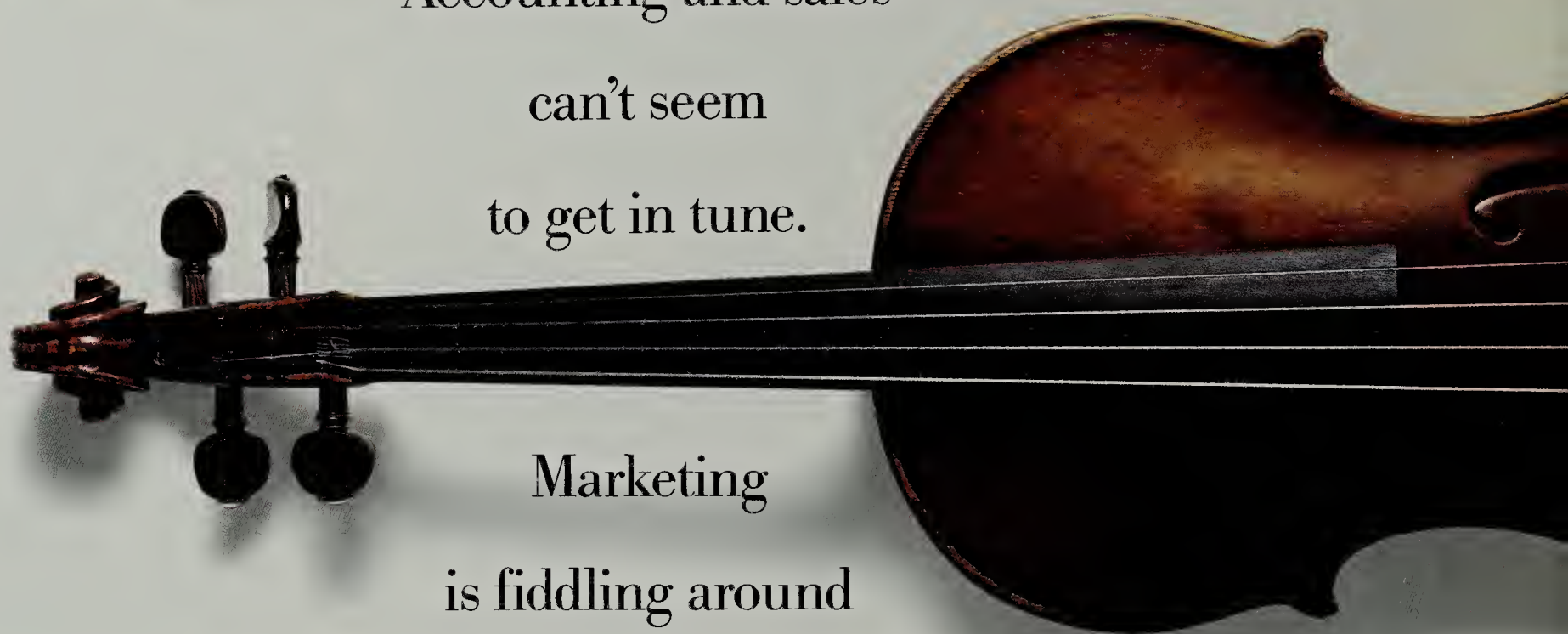
NEWSPAPER

Seagram CIO  
Jack Cooper takes  
document imaging  
worldwide





Accounting and sales  
can't seem  
to get in tune.



Marketing  
is fiddling around  
on their own.



And basically,  
everyone seems to be marching to their own drummer.

Sound familiar?



## EDITOR'S NOTE

# Hitching a ride on the glacier

called up one of my favorite IS guys recently and caught him going live with his new client/server operation — the culmination of a carefully orchestrated two-year rollout. His usual relaxed Southern charm was worn to a fricassee.

"I've had four hours' sleep in the last three days," the manager growled, as he ticked off a verbal list of unnerving things-gone-wrong.

Understand, now: This man is an open systems, distributed computing, client/server *believer*. He chose his vendors carefully, benchmarked hardware 'til it squeaked and extracted every written guarantee he could dream up from his software suppliers.

Still, there were jolting and distressing surprises. Like the database vendor that blithely broke its vow to continue supporting the Cobol interface on his company's Unix variant.

Despite such bumps in the road, however, this manufacturing company remains committed to client/server, confident that the change will quicken its responsiveness to customers, streamline internal business processes and improve overall communication.



Stephen Sherman

If such a mixture of frustration and faith sounds familiar, then welcome to the premier issue of *Computerworld Client/Server Journal*, a reality-based, warts-and-all exploration of these new technologies at work in your businesses.

*Computerworld Client/Server Journal* will focus exclusively on the increasingly open and distributed nature of computing in the '90s. We will cover the topic from many vantage points, including system and network management, case

studies of user companies, multivendor support issues, data security, applications development and more.

As many of *Computerworld's* readers know only too well, the move to client/server can be complex and cumbersome in some places and maddeningly immature in others. Yet no one talks about turning back or unlearning hard-won new skills. As the rewards start to roll in, they are simply too compelling to ignore.

"As an industry, we're still early on in the learning cycle. But I'm hearing some very good stories about client/server from some of our brokerage member firms," said Wayne Fowler, director of technology and network services at the Toronto Stock Exchange, which is already saving 20% annually on cost of operation from its client/server conversion.

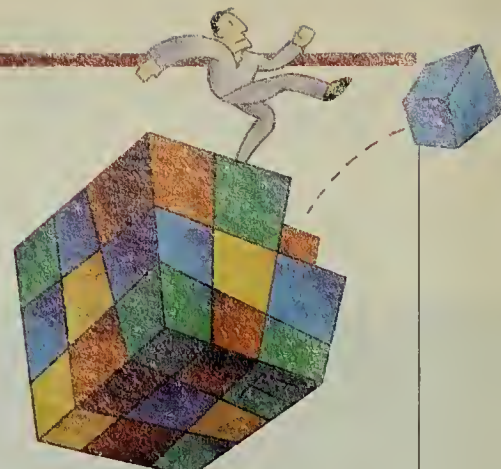
"This is, quite simply, where the business is going," Fowler added. "Client/server is like a big glacier and you've got two choices: Plaster yourself up against the front and try to stop it. Or get on top and ride."



SHOWSTOPPERS, page 17



SEAGRAM, page 12



APPLICATIONS, page 33

**12 COVER STORY High spirits at Seagram** ♦ by Johanna Ambrosio  
The international beverage retailer makes a business case for its leading-edge multimedia document management system, which debuts this summer.

**17 Showstoppers!** ♦ by Maryfran Johnson  
War stories and advice from the user front lines on how to disarm the technical land mines that can bring down your client/server project.

**21 The case for WAIS** ♦ by Charles Babcock  
The Internet's Wide-Area Information Server offers a promising model for information-sharing in the commercial world as well as the scientific and technical ones.

**22 'Open' security: Resolving the paradox** ♦ by James Daly  
Client/server design promises easy access to reams of critical information, yet it can swing the door open to intruders as well.

**27 Whoa! Network traffic ahead** ♦ by Joanie M. Wexler  
Managers try to regain control of communications bandwidth as client/server applications gobble it up.

**33 Decision time for applications** ♦ by David Baum  
Choosing the right applications for client/server vs. host-based computing means factoring in everything from user demands to data requirements.

**48 No trouble for Tribble** ♦ by Maryfran Johnson  
An interview with Sun Microsystems' "objects guru" Bud Tribble, who says the programmer learning curve and immature tools are slowing acceptance of object-oriented technologies.

## ALSO IN THIS ISSUE

## Perspectives

A quarterly compendium of industry events, opinions, research findings and more on client/server issues.  
Page 5

## Exclusive user survey

As more client/server apps roll into production use, our survey of IS professionals shows networking is still the No. 1 hassle.  
Page 8

## User viewpoints

Top IS execs at Hyatt Hotels and John Hancock offer some advice and observations on moving to new environments.  
Page 11

## The CSJ product review

Users put USL's Unix Tuxedo transaction processing monitor through its paces and find some room for improvement.  
Page 40

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IBM Client/Server



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# How do you get everyone working in concert?

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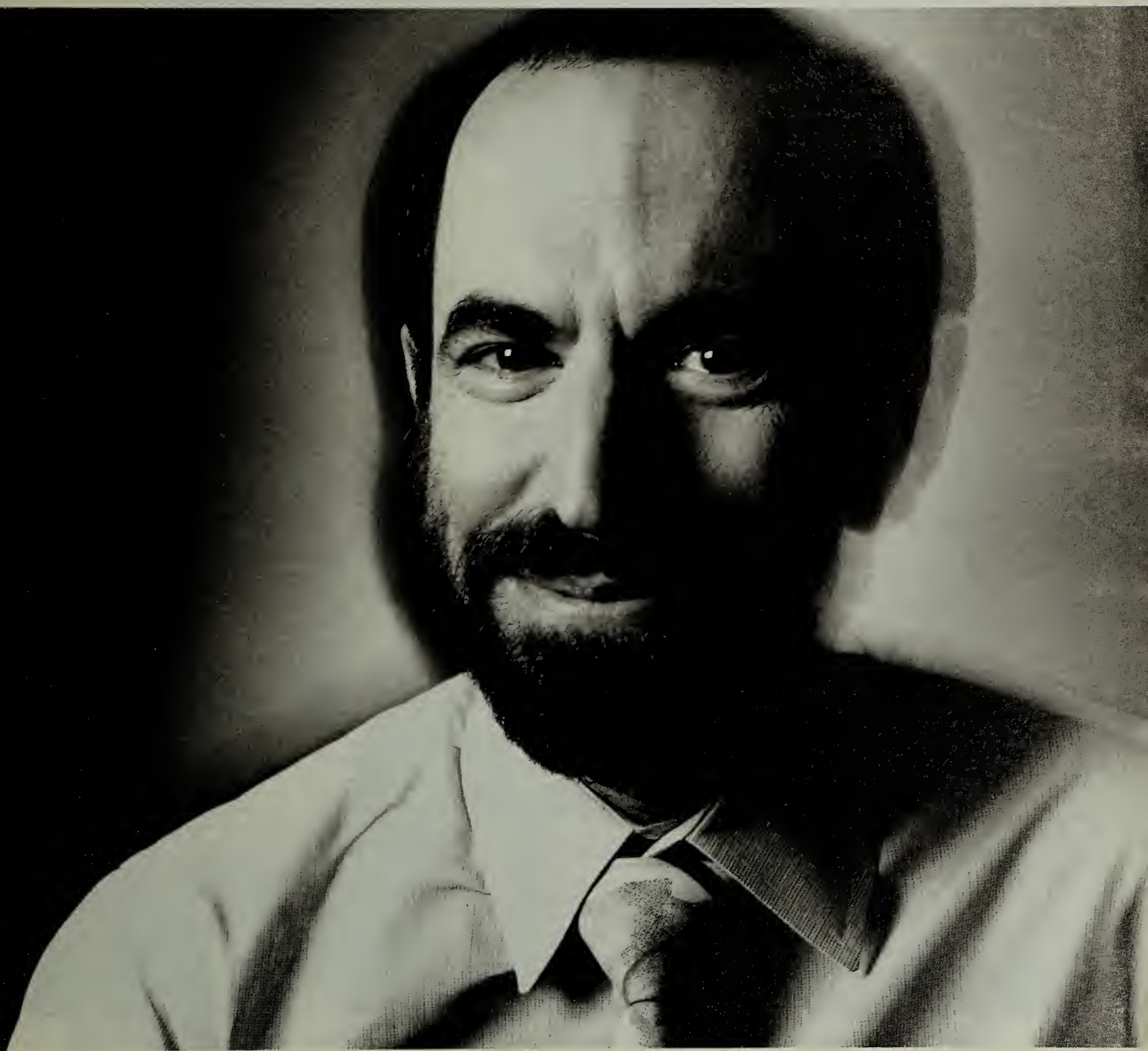
*“There’s a revolution going on in  
computing and business. And  
it creates some big issues to think  
about as you move to client/server.  
Changes in organizational structures.  
Re-engineering business processes.  
Integrating legacy applications.  
And maybe most important...”*



When Bob Epstein, Executive Vice President and a founder of Sybase, talks about computing and business, people listen. After years of developing client/server products and talking with customers, he's seen what works, and what doesn't. Hear what he has to say in a remarkably candid recorded conversation. **For your copy of "Client/Server And The New Organization," call 1-800-SYBASE-1.**

Outside the U.S., call (410) 224-8044. © 1993 Sybase, Inc.







*"From the moment there  
was more than one computer  
on earth, people wanted to  
share information. Everyone  
thought distributed database  
was the perfect answer,  
the Holy Grail.*

*But guess what?*

*The reality is..."*



That's Berl Hartman, Vice President of Product Marketing. She's spent much of her career engineering and developing products that help customers get data into users' hands. In a remarkably candid conversation, she shares her experience and offers some valuable advice. **For your own copy of the tape "Distributing Data In The Client/Server Enterprise," call 1-800-SYBASE-1.**



# PERSPECTIVES

A QUARTERLY REVIEW OF CLIENT/SERVER VIEWS AND EVENTS

## World Cup '94 kicks in client/server goals

**T**he organizers of the 1994 World Cup soccer games — being held for the first time in the U.S. next June and July — said they hope to make history by using advanced technology to manage the world's largest single-sport event. "Never before has a World Cup been handled in a theater of operations like the U.S.," said Juan Jose Vidal Noya, director of technology at World Cup's Los Angeles headquarters. "Client/server was our best architecture choice, given the geographic situation" of the games being held in nine cities.

World Cup chose Sun Microsystems, Inc. as its exclusive hardware supplier, Sprint Corp. for telecommunications and Electronic Data Systems Corp. to handle systems integration, software development and user training. Three multi-processor SPARCcenter 2000s in Los Angeles, Dallas and Washington, D.C., will anchor a network of SPARCstation 10 servers and up to 1,000 SPARC-classics and LX workstations, which will be used to centrally monitor ticketing information, dis-

play scores, provide on-line news service feeds for journalists and monitor track records and all related game logistics.

"Our biggest concern is not so much the client/server technology side as it is user training," said Bud Bencic, the EDS account manager for the World Cup project. Many of the users, he explained, are "soccer buffs who've never used a computer before" — let alone a Unix environment.

The World Cup staff is also growing apace, from 100 a few months



♦ WORLD CUP '94 SOCCER will highlight on-line access to game information



## Mission changes

**COGNOS, INC.**, a mainstay in the minicomputer world with its PowerHouse development tools, is transforming itself into a PC tools vendor for the client/server market. With its Windows NT products slated to appear in March 1994, Chief Executive Officer Ron Zamboni said the \$150 million firm is shifting from direct sales into the reseller channel.

Also working on a change of market is **EPOCH SYSTEMS, INC.** in Westboro, Mass., originally a vendor of network storage boxes for technical workstations. The company is now pushing its client/server data management software, which automates the processes of data migration, backup and recovery. The Epoch software runs on major Unix platforms but is also heading for the PC space.

ago to more than 200 by midsummer. "Unix hasn't scared away too many of them," Bencic said. "We had to put a few traps in the menus, but once everybody gets used to doing double clicks [with the mouse] rather than single clicks, they're OK. But WordPerfect on Unix vs. MS-DOS is not exactly the same, so there's definitely some training involved."

Bencic said client/server was the most sensible choice for the high volume of transactions required by the event management applications EDS will develop.

—by MARYFRAN JOHNSON

## Ready for reality?

Conventional wisdom says client/server is still experimental at most companies. Wrong!

54%

of our random sample have deployed client/server applications in a production environment.

RESPONSE BASE: 219

## Common denominators

**A**berdeen Group in Boston, which is now shipping its *Client/Server Application Development Environment Buying Guide*, interviewed a number of customers who had successfully completed commercial client/server development projects.

Here's what the users had in common:

- They all started with pilot projects, mainly the "high-payoff, make-money" kind rather than

back-office or decision-support projects.

- Corporate visibility tended to be high, which exacerbated fear of failure but was later welcomed when benefits were rolling in.

- Cost justification was surprisingly easy, regardless of project size. Comparing the cost of mainframe development chargebacks to the client/server project helped some, while others justified their efforts via projected returns on investment.

CSJ

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## SIX WAYS TO SERVE IT UP

IBM researchers spent two years studying how major customers at more than 100 sites were setting up their distributed computing operations. What emerged were six basic patterns for client/server design. The first three grew up from the PC/workstation world, and the second three evolved from mainframes on down.

### PC/WORKSTATIONS: UPSIZING

- **RESOURCE-CENTRIC:** Applications run on workstations with direct access to the data. **EXAMPLE:** A hospital with a relational database on the LAN and workstation clients tapping directly into the server.
- **INTERNETTING:** Application logic is split between front and back end, with data secured on back-end server. **EXAMPLE:** 'Gopher' information servers on the Internet.
- **DISTRIBUTED DATA:** Application is split between front and back end, with data 'snapshots' taken periodically and downloaded to local servers. **EXAMPLE:** Financial traders accessing data feeds.

### MAINFRAMES: DOWNSIZING

- **FRONT-ENDING:** No change to existing back-end mainframe applications or databases, but front-end applications adding new business logic, often through GUI presentation. **EXAMPLE:** Customer service center with a new 800 number for credit card operations.
- **DISTRIBUTED LOGIC:** Some mainframe work is off-loaded as application is split between front and back ends. Data is secured on back end and optimized for performance and routed transactions. **EXAMPLE:** Retail store operation.
- **DISTRIBUTED DATA:** Most sophisticated form of data 'staging,' with application split between front and back end but majority of the work load handled on intermediate servers. **EXAMPLE:** Retail bank with mission-critical data on back-end mainframe and daily download of replicated data to branch offices.

## Client/server setup boosts underwriter productivity 25%

**C**igna Property & Casualty Cos. in Philadelphia has turned to a companywide set of client/server product standards to improve its competitiveness and empower a key group of users: the policy underwriters.

"With our new standardized property and casualty client/server system, we are making more viable business decisions because information is more readily available," said Arnold Herenstein, vice president of workstation and office technology. "We're pushing as much of the mystery out of technology as we can and just making it a tool for our underwriters."

The system has boosted underwriter productivity by 25% to 35%, he added, because the employees can work faster and more accurately. For example, the system's electronic forms cabinet, which stocks 200 oft-used policy forms, has helped save time. "Now we don't have to stock 30,000 forms from every state. Employees can just look up the one they want, click on the screen and print it out," Herenstein said.

Anointing specific products as corporate standards has given Cigna "tremendous leverage with the people we buy from," Herenstein noted. It also enables a smoother rollout of newly developed applications to Cigna's enormous 30,000-plus employee user base, he added.

"Standardizing truly focuses our skills on the products we use and encourages a higher degree of interchangeability so that we can transfer a successful program to another division easily," the manager noted.

Cigna's standards guided the consolidation of 73 property and casualty marketing centers into six specialized processing centers serving

more than 4,000 users. The insurer chose IBM Personal System/2 Model 95-type servers, OS/2 2.0, Token Ring networks and IBM LAN Server 2.0 as standards. The underwriters use workstations running DOS 5.0, Windows 3.1, Microsoft Corp.'s Mail, Lotus Development Corp.'s 1-2-3, WordPerfect Corp.'s WordPerfect 5.1, Borland International, Inc.'s Paradox, Microsoft's Access and Attachmate for Windows. With these tools, Herenstein said they are well-equipped to respond to any customer request.

Even so, standards must be constantly re-evaluated. "Standards become impositions if they don't match the requirements of the business," he noted. One of the early screen development languages Cigna used, for example, was dumped in favor of Powersoft Corp.'s PowerBuilder and Microsoft's Visual Basic. **CSI**

### TOOL WARS

Get ready to spend less on development tools during the next few years, says Forrester Research, Inc.'s "Software Strategy Report." In an analysis of 53 early adopters of client/server decision-support systems, the Boston-based consultants predicted that today's \$5,000 tool will cost about \$2,000 by 1996. The downside view, however, was that today's so-called power tools aren't all that powerful, and vendors are not adequately supporting customers yet. Users also lack a "robust development methodology" today. Even so, product shipments for 1993 will reach 64,700 seats, while 1996 will pull out chairs for 700,000 users, Forrester predicted. Fortune 1,000 companies are expected to expand tool use more fully into transaction processing. ■

### CONSULTANT'S VIEW

## A different kind of spirit

Encouraging certain personality traits in your staffers can ease the uproar of a client/server conversion

**W**

ith any new technology, individual personalities and development team "chemistry" have more to do with its success or failure than most organizations realize. Many a company finds itself engulfed by the technology aspects and pays very little attention to the staff implementing the new technology.

Client/server is no exception.

Yet what are the fundamental differences in personnel characteristics in the client/server environment vs. the conventional host-based organization? How do you identify who among your "vintage" Cobol, VSAM and CICS programmers will "make it" over to client/server?

Here are some of the traits to watch for:

**1. A sense of urgency:** The main concept of client/server is a short delivery schedule with use of many desktop tools. Some deliverables have to be provided in a six-month time frame, and once you reach a goal you must set another one. Programmers who have not met deadlines in the past will probably not make it in a client/server environment.

**2. A willingness to forego perfection:** About 90% of almost every deliverable is finished in half the time; the remaining 10% takes an additional 50% of the time. If the programmer will not release the program to the tester for three months, the tester will not be able to test it in less than three months.

**3. An inquisitive mind:** Programmers should become familiar with numerous windows-based graphical user interface (GUI) applications to learn the characteristics of good and bad GUIs. The programmer will also acquire a greater understanding of when it is appropriate to use specific objects.

**4. A taste for exploration:** The person should be open to using new technologies. When programmers are just learning to develop GUI applications, they should be given the leeway to explore the functionality of a front-end tool.

**5. A certain team spirit:** Any group of developers and programmers will learn functions and tasks at varying rates. The environment in a GUI project should be conducive to the interaction of ideas, so the individual must be open to information-sharing with peers. Two or three types of programmers are likely to work on a project: one with front-end GUI expertise, one with database skills and possibly a third who can access the mainframe for legacy data.

**6. Respect toward users:** Because most client/server implementations take place in user departments, programmers who think users are stupid will have a very hard time functioning in this new environment. **CJS**



By Shaku Atre

Atre is president of Atre Associates, Inc., a consultancy in Port Chester, N.Y., that specializes in client/server technologies.

David A. Kelly is a client/server consultant in West Newton, Mass.





Traditionally,  
when you bought something  
from IBM, it came in a box.



## PRODUCTION MODE

Are you testing any applications slated for production?

**YES**  
54% **NO**  
46%



RESPONSE BASE: 100

Are you moving applications to production this year?

**YES**  
72% **NO**  
28%



RESPONSE BASE: 164

Are you moving applications to production next year?

**YES**  
62% **NO**  
38%



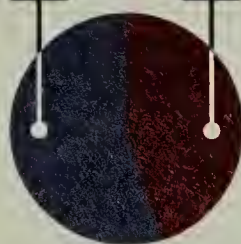
RESPONSE BASE: 46

Move over, old technology. Most Client/Server Survey respondents are testing and moving more and more applications into production now and in 1994.

## STUCK ON THE NETWORK

Are you having networking problems while moving to client/server?

**YES**  
55% **NO**  
45%



RESPONSE BASE: 219

What kinds of networking problems are you having?

**58%** have incompatibilities with their existing network.

**46%** have network management difficulties.

**28%** deal with bandwidth and throughput issues.

**8%** have other network problems.

RESPONSE BASE: 99  
(MULTIPLE RESPONSES ALLOWED)

## HOW ARE YOU DEFINING CLIENT/SERVER?

RESPONSE BASE: 219

**33%**

**CLIENT**

Presentation and some business logic

**SERVER**

Additional logic, data management and fully distributed systems

**24%**

**CLIENT**

Presentation and some business logic

**SERVER**

Additional logic, data management and some distributed systems

**22%**

**CLIENT**

Presentation and some business logic

**SERVER**

Data management

**19%**

**CLIENT**

Presentation

**SERVER**

Everything else

**2%: Don't know**



# You're further along than you think

**Our exclusive survey finds a majority of IS shops running some production applications under client/server**

**F**or those who doubt the progress of client/server computing, we have new evidence of its steady growth as a primary systems platform. *Computerworld's Client/Server Journal* survey reveals that a majority of the 219 information systems professionals polled run production applications in client/server environments.

One-third of the survey respondents consider client/server a key part of a broader company strategy, while 11% consider it more of a departmental project. Only 8% are still in the pilot stages.

Networking surfaced as a major

problem area for most of the users surveyed, with incompatibilities among existing networks representing the most significant headache, followed by network management and throughput issues.

The survey also showed that the level of client/server computing is more advanced than many experts believe.

One-third of the professionals defined their client/server efforts at the most advanced level: That is, user presentation and some business logic are on the client, while additional logic, data management and fully distributed systems are on the server.

Another 24% have some distributed applications on the server and the same business logic split as the first group, while 22% have all the logic and presentation on the client.

Only 19% are defining client/server as presentation on the client and everything else on the server — which is similar to traditional non-client/server computing models.

In addition to running production applications at a high level of client/server implementation, a large portion of the users are testing additional production applications to roll out this year or in 1994.

**What is your level of client/server activity?**

**40%** are building new applications in client/server.

**34%** are building new applications and migrating to client/server.

**20%** are migrating to client/server.

**6%** don't know.

RESPONSE BASE: 219

Despite their interest in client/server, the respondents cited object-oriented systems as their greatest technology interest. Electronic-mail-enabled applications, work-flow systems and systems management middleware — the more client/server-related technologies — were next on the list.

#### METHODOLOGY

The survey was conducted and tabulated by First Market Research, an independent telephone research firm in Austin, Texas. A random sample of IS organizations were polled.

—by **MICHAEL L. SULLIVAN-TRAINOR**,  
Computerworld's research manager



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about connecting data with  
applications, implementing  
enterprise client/server would  
be easy. It's getting them to  
work together without losing  
performance or functionality  
that keeps you up at night. And  
to solve it, you have to..."*



Mark Page knows the situation well. Vice President of Connectivity Products at Sybase, he's helped a long list of customers develop integrated solutions to one of the most significant problems in client/server computing. He shares that experience in a taped conversation *"Making Connections In Client/Server Computing."* For your copy, call 1-800-SYBASE-1.



## THE USER EXPERIENCE

# HYATT HOTELS: Sticking with simplicity

**E**xperience in the art of science and technology shows us that the best designs are simple, elegant and effective. The information technology industry has too many examples of complex and complicated systems that fail the simple test of effectively solving a business problem.

If you want to be successful in developing client/server applications, you must define and follow an architecture that is simple to describe but solves your problems.

We at Hyatt Hotels Corp. faced an array of technology choices in 1988 when we began our conversion to the new heresy of open systems. We evaluated Application System/400s vs. Unix-based systems; traditional vs. relational databases; Oracle Corp. vs. Informix Corp.; C vs. fourth-generation language (4GL) programming—to name a few. Our final selection seemed almost too simple: Choosing the Informix 4GL implied Unix and relational technology, while having Unix allowed more freedom in selecting hardware.

Kerr is senior vice president of MIS at Hyatt Hotels Corp.



**This five-year client/server journey sidestepped the knife-edge technologies and trimmed operating costs by up to 40%.**

In the end, our technology selection was put to the test by benchmarking and pilot-testing the entire set of architecture choices. Hyatt created a test using the Informix 4GL to emulate a central reservation system, the most technically demanding application we face. That benchmark proved that the architecture hung together.

Yet decisions sometimes loop back on themselves, reappearing in other guises years later. Our first two applications were developed using these architectural choices to create a number of sales and reporting systems. When it came time to begin the reservation project, there were a number of seemingly new technical choices to be evaluated. Oracle had announced new versions; Sybase, Inc. and The ASK Group, Inc.'s Ingres Products Division were being used for large applications; Sequent Computer Systems, Inc. had a new and faster

box; and so on.

But we stuck with our initial architecture choices, which in hindsight was not only the right decision but the only decision. Make sure the first major architectural decision you face — whether it's object-oriented vs. relational or Smalltalk vs. C++ — will meet your demonstrable requirements during the next three years. If it does, don't change your mind because of some new feature.

**TEST BOUNDARIES** Don't choose knife-edge technologies that have great promise but are at the boundary of current capabilities. I wouldn't try to build a reservation application in a powerful, object-oriented language yet.

You also need to evaluate what to do if a choice goes bad. This testing of future horrors is not just an intellectual exercise; it is critical to everyone's understanding of how the architectural choices fit together and how they can amplify your productivity.

**LEVERAGE YOUR CHOICES** Once you've chosen your architecture and

you've stuck to your guns by not changing technologies every year, look for the simple and effective way out of some difficult application development situations: Buy the solution elsewhere.

It still amazes me that our industry writes as much custom code as it does, given how similar many of our problems are. We may still be 10 years away from reusable applications — and two to three years from reusable objects — but it doesn't mean we should ignore off-the-shelf solutions for basic applications such as payroll.

*By Gordon Kerr*

**SIMPLE IS BEST** Hyatt has stuck with its approach for five years, not without challenge and resistance. But it has served us well, saving us 30% to 40% in operating costs and forming the basis for our major applications, including reservations.

We've evaluated some new technologies such as Powersoft Corp.'s PowerBuilder, but we haven't yet gotten the full benefit of our experience in the current architecture. Simplicity has its own benefits, and they keep getting bigger every year. **CSJ**

## THE USER EXPERIENCE

# JOHN HANCOCK: Filing a claim in future technology

**I** may be dating myself, but I can't help comparing today's ubiquitous "client/server" with the single word of career advice given to the young Dustin Hoffman's character in the movie *The Graduate*: "Plastics!"

During the past few years, while we in the IS profession prepared for the arrival of the new world of client/server, somehow that new world arrived. The paradigm shifted — even though we're not ready, and the technology is neither mature enough nor industrial-strength yet.

For us, client/server has more or less evolved during the past three years. At last count, within John Hancock, we had more than 30 client/server applications on-line. Some are fairly simplistic and intended for decision-support use, while others are transaction-oriented and very complex, such as our group underwriting and billing system for our group clients.

The issue is no longer "Will we build client/server applications?" but "How will we build and manage client/server systems?" for an enterprise with more than 400 field offices. By next month, we should have in place the first

Smigel is vice president of corporate information services at John Hancock.

milestone on this long journey: our definitions of five models for distributed computing and recommended standard products for each model.

Our efforts began last year when we devised and adopted an enterprisewide technical strategy that outlined our vision and goals. This year, we are laying the foundation for an industrial-strength client/server environment.

We think of our client/server environment in terms of three interrelated management domains: execution, development and operations architectures.

The execution architecture

is driven by technical requirements for client and server. It consists of hardware platforms, databases, distributed services and communications protocols.

The development architecture encompasses tools and methods for building applications. To prepare for skill set changes, we will be setting up new educational curricula and retraining plans, including on-the-job mentoring. We also



*By Diane Smigel*

**Two years of careful study led this giant insurer down a new path.**

use outside consultants to augment our skills base and accelerate our learning curve.

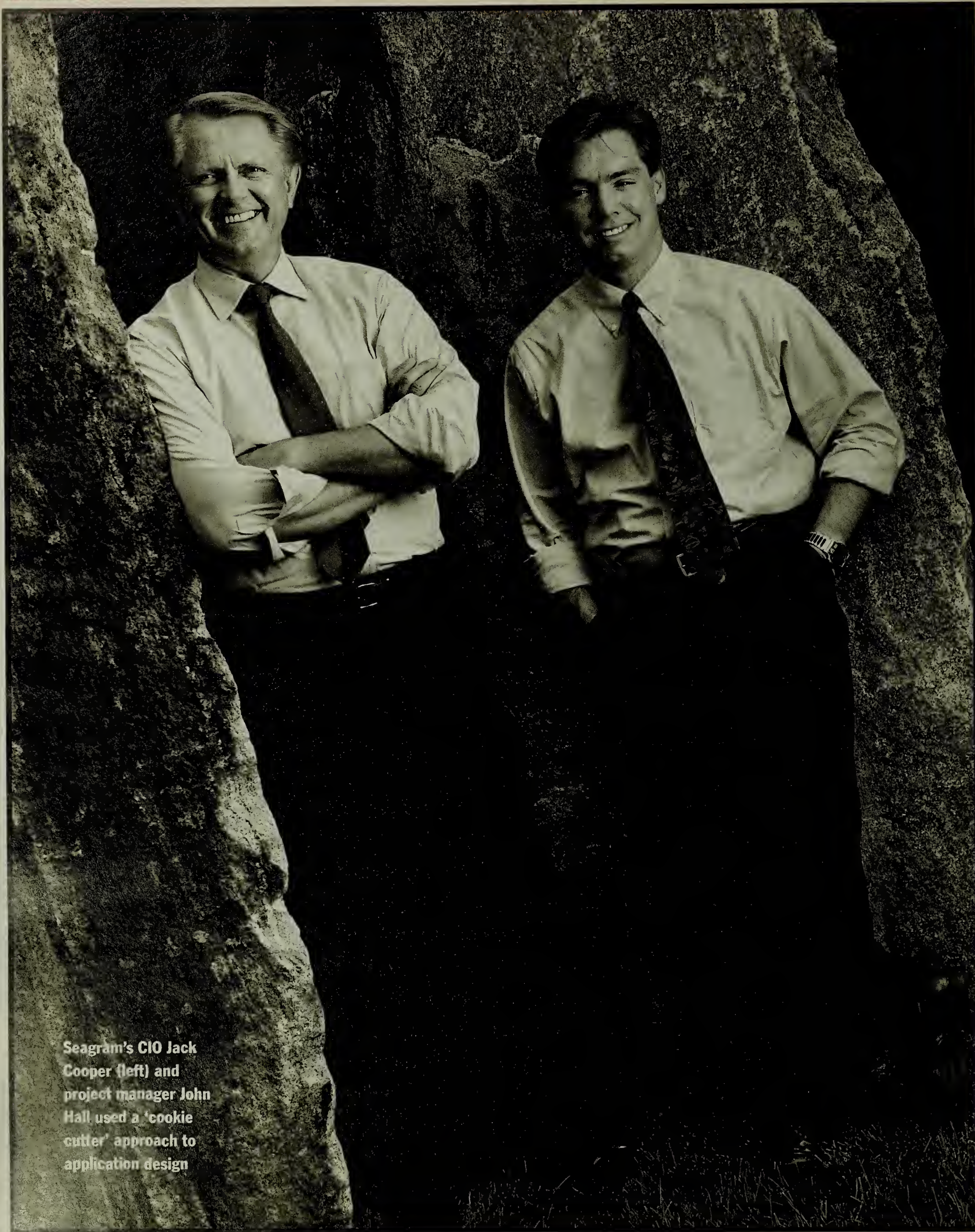
The operations architecture consists of the products and processes for managing applications in a production environment. This domain presents what is perhaps the biggest challenge as we switch from a platform-centered approach to a new model of managing distributed computing resources.

We have active projects under way on many fronts, from upgrading our wide-area network to automating software distribution and password synchronization — to name just a few. Sometimes it seems like an endless web, with every project on the critical path!

Collaboration and cooperation are the watchwords for our client/server strategy work, which involves more than three dozen people in our Boston headquarters. Associates from across the firm are also involved in a variety of task teams and committees that make up our Client/Server Environment Project.

We do not expect our initial cut at client/server architecture to answer all of our questions about distributed services and network management. But we do expect to provide leadership and direction to a diverse business community across the company and establish solid ground for future systems development. **CSJ**





Seagram's CIO Jack Cooper (left) and project manager John Hall used a 'cookie cutter' approach to application design

Webb Chappell



# HIGH SPIRITS AT SEAGRAM

By Johanna Ambrosio



**The international beverage retailer makes a business case for its leading-edge multimedia document management system**

**S**o what do you get when you cross an upstart technology with a venerable retailer of beverages, wines and spirits? In the case of 136-year-old Seagram Co., the result is a multimedia document management application that is the most far-reaching yet in a companywide move toward client/server architecture.

"The ideal is boundary-less document access anywhere in the world," said Seagram Chief Information Officer Jack Cooper. A document may originate in Hong Kong, be reviewed by someone in the U.S. and eventually wind up stored on a computer in London.

The system, called Open Document Management System (ODMS), will also be useful for online companywide procedure manuals, where a video clip might illustrate a new technique or a new chapter could be added to the manual via voice annotation.

While not quite finished, ODMS has already begun accruing benefits for the accounts payable department — the first end-user group to adopt it. Among the time-savers are the following:

- The ability for employees to send and receive faxes from their desktop computers.
- Immediate access to scanned purchase orders instead of up to a two-week wait to get a microfilm tape developed.
- Voice annotation of purchase orders, which allows managers, for example, to tell processors to expedite a certain customer's account.

The big payoff arrives later this month, when the accounts payable group should have received and worked out the kinks in its work-flow management software and a tool to alter the work flow at will. The in-house-developed software will allow employees to set up, and later change, who gets to see which documents and in what order the purchase orders work their way around the department.

With those tools in place, accounts payable will be able to cut down on the time it takes to process customer inquiries. One customer service representative will be able to answer any question instead of customers — both outside suppliers and Seagram employees — having to search out one of 18 specialists.

Managers will also be able to track the productivity of each step of the accounts payable process — as well as that of each employee — through an audit trail.

Eventually, the White Plains,

N.Y., accounts payable users will be joined by Seagram brethren around the globe, Cooper said. His goal is to persuade three groups each month to implement the system.

**STARTING THE HARD SELL** Once the document management software and tools have been put in place and have been proved to work, the sales pitch starts in earnest. Cooper and his team were scheduled to demonstrate the system to Seagram's Scotland subsidiary, although to date no other group has taken the bait.

By using a "cookie cutter" development approach, Cooper said, his group will be able to help end users customize ODMS wherever they may be.

ODMS joins two other client/server applications already deployed at Seagram: a sales reporting system that executives use to determine global sales by customer and a human resources information system.

Within five years, Cooper said, Seagram will move entirely to an information architecture based on two tiers: end-user workstations that are equipped with a graphical user interface and multimedia capabilities, and a network of servers ranging from PCs to mainframe-class machines.

Seagram has the majority of its production applications running on two IBM Enterprise System/9000s and a Digital Equipment Corp. VAX 6000 in data centers in New York and Bradenton, Fla. Some 35 IBM Application System/400s that are scattered throughout the world run a standard suite of financial applications

Seagram's 1993 revenue by product

Spirits and wine

\$4.7 billion

\$1.4 billion

Fruit juices, coolers and mixers

For the year ending Jan. 31, 1993, Seagram reported \$6.1 billion in revenue. Net income was \$677 million.

Seagram does business in 34 countries. In 1992, the company opened offices in China and by the end of this year will have offices in the Ukraine.



♦ SEAGRAM'S 1430 PEELE ST. headquarters in Montreal reflects its mid-19th century roots

SEAGRAM, page 14 ♦



SEAGRAM, from page 13

and some production and logistics. The company will continue to use these larger, proprietary machines as databases and other types of servers. "This will happen in concert with the re-engineering of our business," Cooper explained.

**IN THE BEGINNING** The business traces its history back to 1857 with the founding of Joseph E. Seagram & Sons' distillery company, which merged in 1928 with Samuel Bronfman's Distillers Corp. It was the Russian-born Bronfman, whose descendants still run the firm, who molded Seagram into a corporate powerhouse that today manufactures and distributes the best-selling brands of whiskey in the world.

The Seagram portfolio of products ranges from Chivas Regal and Perrier-Jouet champagne to Monterey Vineyard wines and Tropicana orange juice. Its global reach of 34 countries on six continents underscores the importance of its move to client/server applications such as ODMS, which Cooper said must meet specific business needs but also be tailored to work anywhere in the company.

Thinking globally was also the mind-set behind Seagram's earlier client/server applications — a sales reporting system and a front end onto the mainframe-based human resources applications — which have been running for about a year.

Because of their simplicity, they were "good candidates" for the company's first client/server forays, said Joseph Herrin Jr., director of systems development. Both are essentially decision-support applications that "are relatively inexpensive and safe because they do not directly impact the business, although they help in running it," he said.

Furthermore, both applications share a common architecture: an Intel Corp. i486-based PC acting as a file server on a Novell, Inc. local-area network. In both cases, data from other sources is summarized onto a Gupta Corp.

**T**he employees in accounts payable can use the new system for instant on-line access to purchase orders that once took as long as two weeks to obtain.



PROJECT MANAGER JOHN HALL works with Candice Puleo and Luisa Greco on the ODMS system

SQLbase relational database management system that runs on the server. Windows-equipped PC clients complete the picture.

The nonaffiliate sales reporting system is used to help Seagram executives track what they sell in countries or locations too small to have full-blown offices. These locations do not have the usual back-office operations that support larger Seagram entities "so they lack some information about the state of the business," Herrin noted. "We wanted to provide some electronic means for them to see how their business is doing, instead of getting monthly printed reports from different sources."

Data from different shipping locations is sent to the PC LAN in New York via a standardized transmission format. The data is then processed and loaded into the Gupta DBMS, from

which it is transmitted to servers in three other Seagram offices. Herrin's group is adding more kinds of data to the mix, including accounts receivable, and is setting up data extracts about specific customers and products within the geographic regions. Currently, the data is set up by region only.

As for the human resources system, that is simply a graphical front end to mainframe human resources applications.

"The idea was to provide easier access, not to replace the mainframe systems," Herrin said. Rather than logging on to the network, the mainframe and the specific applications — and then navigating through whichever application is required — users simply log on once and view a menu of choices.

"We extract the data that is most important to the users, which they select," Herrin said. The data extracts are updated monthly.

In contrast to these decision-support applications, ODMS was intended as a more strategic, bet-your-business kind of system.

It took a little more than a year and about \$400,000 to develop the document management system with a two-person team that used off-the-shelf tools (see related story page 16). It will cost roughly \$5,000 per user to deploy, Cooper said. That deployment cost covers most of the client hardware and software, including a Macintosh with a 21-in. color screen, a runtime license for the image decompression software used to view the scanned images, plus all the software to track, view and manipulate the purchase orders and related information.

The scanners and software used to scan the purchase orders into ODMS are not included in that price.

No outside consultants or services were used — one reason why ODMS was "on time and on budget," Cooper noted. "We can't always claim that, but it happened with this one."

Because of the global rollout intent, there were several tenets that the ODMS design team held to: scalability, open architecture, support for as many national languages as possible and the ability for end users to change the system as their business requirements change. To accomplish this, Seagram developers built the server database — Sybase, Inc.'s Sybase running on a Hewlett-Packard Co. 9000 Model 720 — to dynamically configure each user's screen

## Object (and other) lessons

As a triple-play veteran of client/server projects, Seagram has learned firsthand about the joys and sorrows of this brave new computing world.

Some of the advice the staff offers for novices is as follows:

### THINK BACKUP AND RECOVERY

"It is absolutely essential that you have the appropriate levels of backup and recovery, and they have to be a part of the system design," CIO Jack Cooper warned. "But you don't have as much canned material to do this with client/server software as you do on the mainframe, so you have to write your own."

### PREPARE STAFF FOR CHANGES

From a programming standpoint, client/server is much more "rigorous" to deal with, Cooper noted, and there are fewer people who know how to do it. To address this concern, Cooper brought in Joseph Herrin Jr., director of systems development, and John Hall, distributed systems project manager, to head up client/server development at Seagram about two years ago.

As the company moves its legacy systems over to the new environment during the next three to five years, the IS staff members who work on those systems will be trained "so they can develop on the new technology," Cooper explained.

### WAIT OUT THE LEARNING CURVE

Herrin said it takes about six months for an experienced C programmer to become "reasonably" productive in C++ object-oriented techniques and "to realize what you have and what you can use."

That learning curve, while steep, pays off on subsequent projects, he added.

### PLAN FOR SCALABILITY

While working through the challenges, Cooper said, remember the goals of client/server. They include enormous scalability, the ability to design once and deploy many times and uniformity of systems throughout the company.

Delivering "strong functionality" to end users is another important benefit. Users "can do more, with a higher degree of control over the work process and a higher degree of productivity," Cooper said.

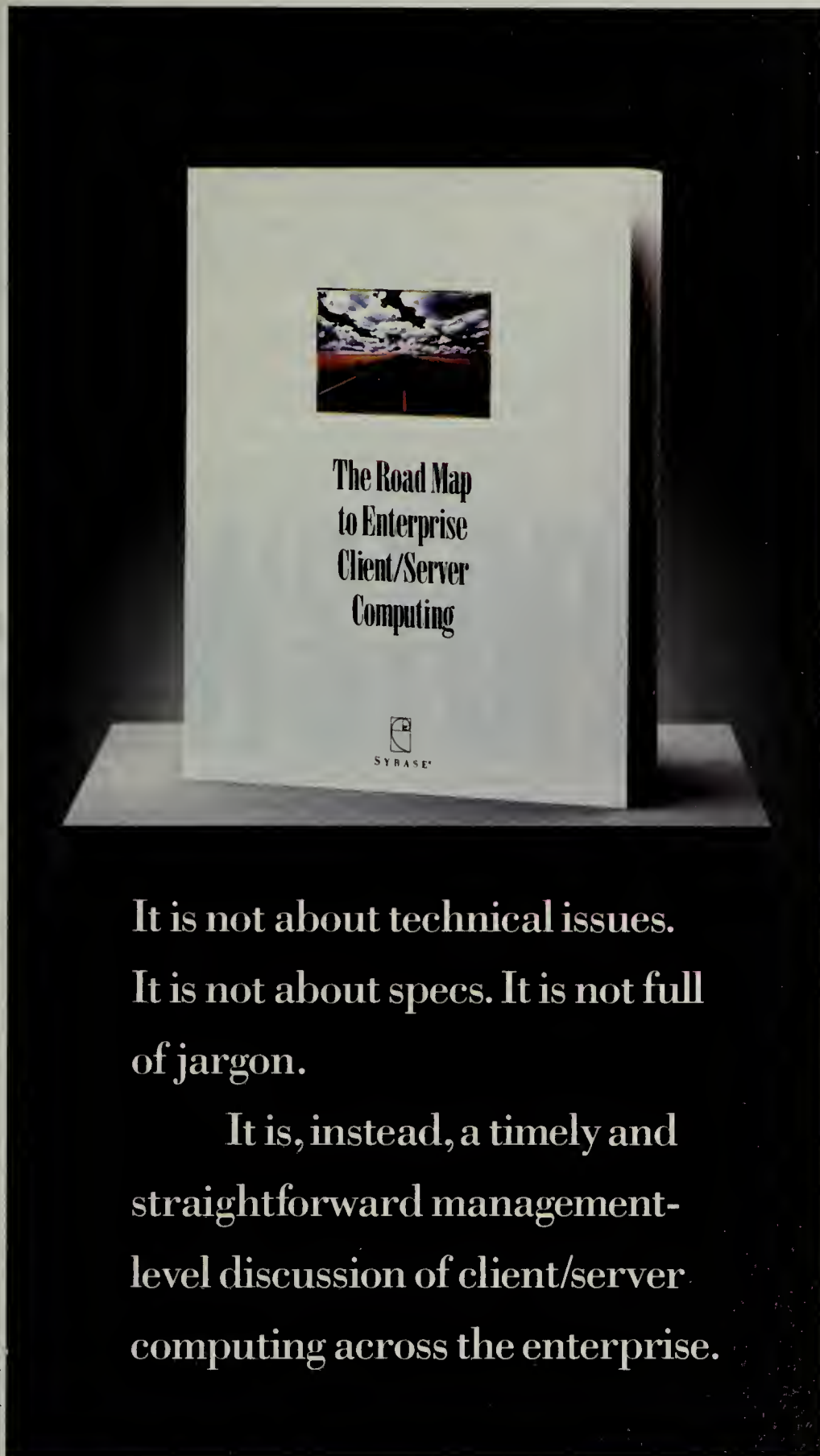
### DO THE MATH... AND BREATHE EASIER

Finally, something sure to warm the cockles of many CIOs' hearts: Seagram has found that developing for client/server is 12% to 15% less expensive than developing for other platforms. These costs include hardware, software development, system design and planning. Support costs are about "break-even" from one platform to another, Cooper said. ■

SEAGRAM, page 16 ♦



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SEAGRAM, from page 14

depending on the needs of that person. This approach was taken instead of the "hard-coding" approach traditionally used for applications, where the same screen is provided to every user.

Although the server database is currently on the HP machine in New York, that may change as other departments adopt ODMS. The server can sit at the end-user location, as the business rules and data it contains are department-specific anyway, or it can be located at some central IS site.

The fax server is an Intel-based machine, as is the image server, but most of the hardware components — except for the Macintosh client piece — can be changed later. For example, the server portion that currently runs under Unix on the HP 9000 can run on any Unix machine. Similarly, other parts of the C++ language-based ODMS code are portable.

As requirements change, IS needs only to update the server database instead of each client machine. Alternately, users will be able to make some changes themselves once the work-flow tools are delivered this month. In accounts payable, for example, if an invoice over \$10,000 needs management approval and that amount is later raised to \$25,000, users can amend the work-flow software rules.

The open architecture also separates the various components of ODMS into Macintosh objects: one for retrieving scanned images from the scanner, one for faxing, another for viewing the image on the Macintosh, etc. If Seagram needs to change one object down the road because, say, a more efficient decompression algorithm becomes available, it will not impact the other objects. Also, new objects, such as one for video, can be added with minimal disruption.

But openness comes with a cost. "Building flexibility in up front

doubles development time," said John Hall, distributed systems project manager. "You realize the benefits later, when users can make the changes instead of having to go through IS."

Scalability was another key design element, so the system can be used by a relatively small operation such as the one in Chile or by a large transaction environment such as Seagram's U.S. operation.

So far, about eight people in accounts payable are using ODMS. By year's end, that number should

**T**he cost of developing the client/server project was 12% to 15% cheaper than on mainframes. It took about one year and \$400,000 to create a document management system.

grow to about 20, including some people in California who will use viewing stations to access accounts payable data. Until then, Seagram's employees must ask that the data be faxed to them.

Candice Puleo, accounts payable supervisor, said she is "very happy" with the new system so far. Currently, invoices are processed by having the paper mail sorted out by type of bill and then delivered to the appropriate specialist. The phone bills go to one person, the supplier bills to another and the bills from Seagram affiliates to yet another person.

"If there are any questions, the customer has to call that person," Puleo explained. The person then has to rifle through a stack of paper to find the invoice and determine the status.

That will change with the workflow software, which will allow the customer service representative to handle all queries. "That's going to be a big savings of time," especially given that the department processes about 450 invoices each day, Puleo said.

**LESS TIME ON AUDITING** Another benefit should show up during the group's audits, which Puleo said are "continuous." Before ODMS, those often required grueling searches for microfilm. In one recent instance, she had to wait four months to receive more than 400 boxes of paper for an Internal Revenue Service audit. The imaging system will be a "real time-saver" for audits, she added.

Nevertheless, Puleo said, as the first users, "we're working out the bugs."

Most of the problems have been resolved, but printing a scanned invoice still takes up to five minutes. Earlier on, there was also a wait of up to a couple of minutes to save each scanned image, but that was fixed by moving one of the servers from New York to a technical center near the accounts payable department.

"That's put us a little behind in scanning," Puleo said, "but these kinds of things are par for the course. All in all, we're lucky to be working with the in-house IS group because so far there's nothing we've asked for that we haven't gotten."

Originally, Seagram had looked at off-the-shelf imaging systems. But at a onetime deployment cost of \$40,000 to \$100,000, members of Cooper's team determined they could do it themselves for less money in the long run and meet specific business needs as well.

"We're ensuring our architecture stays open and is geared for the future," Hall said. **CSJ**

Ambrosio is *Computerworld's* senior editor, systems & software.



THE CLASSIC LOOK of Seagram's Scottish distillery belies its high-tech operation

## Managing documents the multimedia way

**A**mong the first Seagram facilities to try out the new document management system this fall will be the accounts payable department in the Scottish Highlands near Keith, home of the Chivas Regal and Glenlivet brands of whiskey. Employees using the new method will follow this procedure:

After a purchase order is scanned into one of two Macintoshes, an employee working as an indexer pulls the image up and keys in several fields of data about that purchase order.

Assuming there are no problems with keying in the fields, the data is entered into the Sybase database running on a Hewlett-Packard 9000 main Unix server. If there are problems keying in the proper data, the indexer logs on to the mainframe from the Macintosh and searches through the host financial software for the proper information.

The image is actually stored on an optical server, which is now a Sun Microsystems, Inc. workstation, but will soon move over to the HP 9000 server. The optical server moves the image files between the end user's magnetic disk on the Macintosh and an optical disc setup controlled by a Laser Magnetic Storage, Inc. jukebox.

When employees in the accounts payable department log onto the Macintosh, they will see several things on the screen: a listing of all the purchase orders that have been scanned in and are awaiting processing; a window into the corporate mainframe; and objects providing users with functions such as sending or receiving faxes.

To send a fax, the user will activate the fax icon on the Macintosh and fill out a form. That request is then shuttled to the HP server. A separate machine acting as a fax server — a Compaq Computer Corp. 386-based computer — polls the HP server every 30 seconds and takes over when it finds a fax request. ■

### COOL TOOLS

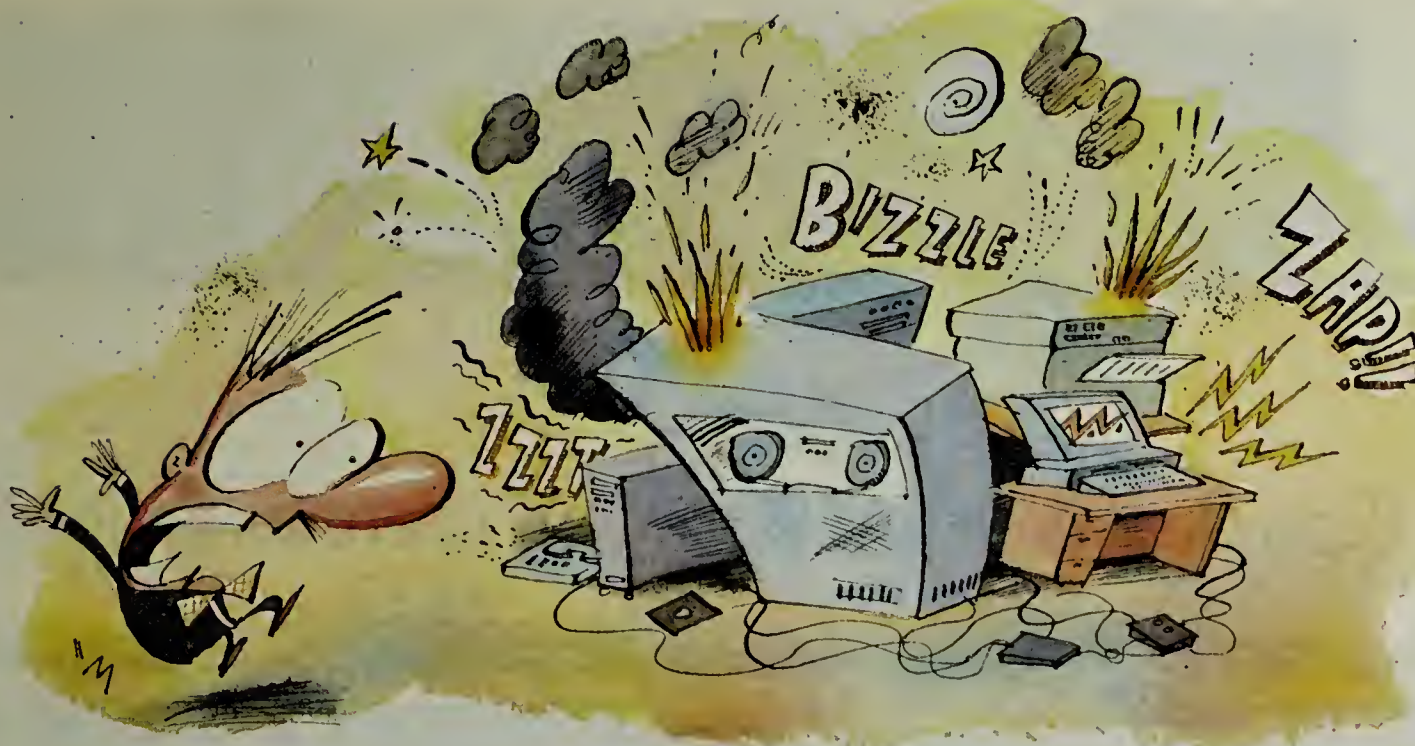
Seagram developed — and delivered — its multimedia document management application on the Macintosh "because it already has objects for sound and video," said Joseph Herrin Jr., director of systems development. "We didn't have to buy special equipment for the PCs."

Another factor was that Macintosh desktop tools are "years ahead of other platforms," he noted. And in client/server development, the tools loom large in importance.

Here is a sampling of what Seagram used to create its new system:

- Apple Computer, Inc.'s Worldscript, which will allow the IS group to localize the imaging system in different national languages, including Spanish and French.
- Apple's MacApp Object Framework, a collection of ready-made objects. The team also reused objects from other client/server projects. Previous experience with MacApp was yet another factor in the tool's favor, said John Hall, distributed systems project manager at Seagram. "It's got hundreds of ready-to-use objects," he said.
- TMSFAX tool kit from TMS, Inc. in Stillwater, Okla., to write the object that compresses and decompresses the purchase order image as it moves around the network. "It's debugged, and it works," Hall noted.





**Coping with the technical and managerial snafus in migration and conversion projects**

# SHOWSTOPPERS!

**O**ne of the war stories making its way around the client/server conference circuit recently concerned a Chicago-based bond trading company and its unfortunate experience with a Unix utility called cron.

Seems that cron, which can be set up to run certain computing jobs at specific times of the day, was primed for a crucial 3 a.m. processing job every night. Before cron swung into action, however, a series of smaller jobs had to be run for about an hour each night, beginning at midnight.

But one night the data center operator was ill, and the small jobs didn't begin their run until 2 a.m. They also didn't make it to the finish line. And cron did what every good Unix utility does: what it was told.

The result was a showstopper — in this case, a commercial processing snarl with the wrong data overwritten or erased and financial records compromised. Senior managers at the Chicago firm reportedly "went ballistic."

The moral of the story — one that mainframers particularly relish — is that complex business processing environments still require the built-in protections and controls that large systems were fine-tuned over the years to provide.

Johnson is editor, *Computerworld Client/Server Journal*.

*By Maryfran Johnson*

As commercial enterprises today migrate away from the safety of the traditional glass house toward the greater flexibility of distributed client/server systems, they are bumping into a new lineup of project showstoppers. These technical and managerial snafus can halt a conversion or migration effort for hours, days and even months.

"Client/server ought to come with a label saying: Misuse of this could be harmful to your health," said James Daly, director of human resources administration at New England Telephone Co. in Boston.

A recent survey conducted by *Client/Server Journal* among 219 corporate users at medium- to large-size businesses showed that 38% experienced technical problems that stopped projects cold for one to three months' time. Another 19% got stalled for at least a week; 13% for more than three months; and 10% for at least one day. Only 19% reported no work stoppages from technical difficulties.

"Everything that applies to good business practices in computing in general applies to client/server, but people overlook that," said Wayne Fowler, director of technology and network services for Canada's Toronto Stock Exchange, one of the pioneering users of open systems for mission-critical business computing.

Among the most commonly cited delays in client/server projects are the cost of training and retraining users, the need to fill in feature/function gaps in third-party software and the tedious job of integrating multivendor systems.

## THE WISDOM OF SALOMON

From a vantage point of four years' experience in distributed systems, Sam Malek, a technology manager at Salomon Inc in New York, offers some lessons learned:

- Encourage company-sponsored standards to avoid future support headaches.
- Emphasize the importance of basic procedures in security, backups, release management and disaster recovery.
- Play up team achievements but reward individuals as well.
- Partner with suppliers to get high-level commitments for your project's success.
- Set up meaningful career paths and retraining plans for staff affected by the implementation of new systems.

"What happens in client/server is the negative gets amplified and you find yourself deeper and deeper in trouble," Fowler noted. "In essence, client/server amplifies stupidity. If you're stupid about systems development, design or requirements gathering, you essentially end up far worse, quicker."

While showstoppers are often as highly individual as the business itself, there are several categories they seem to have in common: performance testing, networking, support, personnel and software issues.

SHOWSTOPPERS, page 20 ♦



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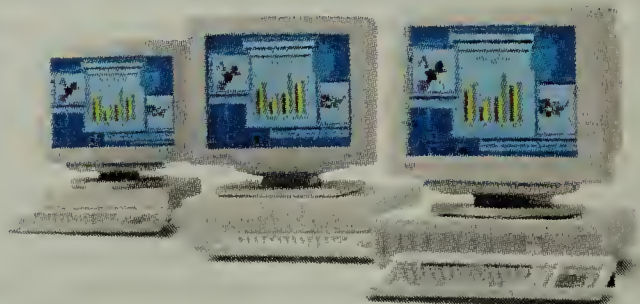
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SHOWSTOPPERS, from page 17

## TESTING IS 'INSANITY PLUS'

One showstopper the Toronto Stock Exchange encountered involves performance testing in the complex client/server environment. "It's insanity plus," Fowler said. "We've found a tremendous lack of structured test tools and a tremendous misunderstanding of rigorous testing processes."

In the mainframe environment, testing a fixed number of screens or fields is commonplace. "But what happens when you have multiple windows?" Fowler asked. "What happens when applications pick up information from one win-

where there haven't been any before."

To sidestep network bandwidth problems, one major New York securities firm "over-engineered" itself by wiring up each trader workstation with eight strands of fiber-optic cable plus 10 strands of copper unshielded twisted pair.

Although the use of Ethernet and Transmission Control Protocol/Internet Protocol (TCP/IP) networks is a mainstay in many client/server shops — particularly Unix-based ones — there are still messy issues with getting it to work right, users said.

The Toronto Stock Exchange found that the first implementation of TCP/IP on a Tandem Computers, Inc. mainframe did all the networking within the CPU, for instance. "So we ended up having the busiest task in the system being the TCP/IP driver because the way Ethernet and TCP/IP work, they monitor all the traffic and pick up what's yours," Fowler explained. "You spend all your time monitoring traffic. We had to segment the network with Cisco routers and hang them

around the Tandem to isolate it from traffic that doesn't belong to it."

## 3 SUPPORT TAKES ON NEW DIMENSIONS

Higher-than-anticipated levels of technical and administrative support are frequently cited as showstoppers in client/server projects. One particular pitfall, oddly enough, can be giving users exactly what they want. That can spawn a highly diverse, mixed environment that escalates and complicates support needs.

"How companies address that support cost will dictate how successful they will be," said New England Telephone's Daly.

"There is a whole learning phenomenon with client/server that has not been properly scoped out yet," Daly said.

New England Telephone emphasizes a strong education component for its technologies, Daly said, including a resource center where employees are encouraged to come for hands-on training. The company uses both formal and informal training approaches such as classroom teleconferencing or placing individual learning centers in heavily populated business locations.

## WATCH THAT DATA STRUCTURE

As Florida-based grocery retailer Kash n' Karri Food Stores, Inc. got its client/server conversion under way, old data structure was "one of the things that slowed us down," said Jim Stikeleather, director of systems development. "We discovered how poorly thought out our data is, so we front-loaded this project with huge enterprise modeling activity.

"We were surprised how much we had to do on the data side," he added. "It took one whole team normalizing data to set up a relational table, clean up the existing system and understand what we were really doing."

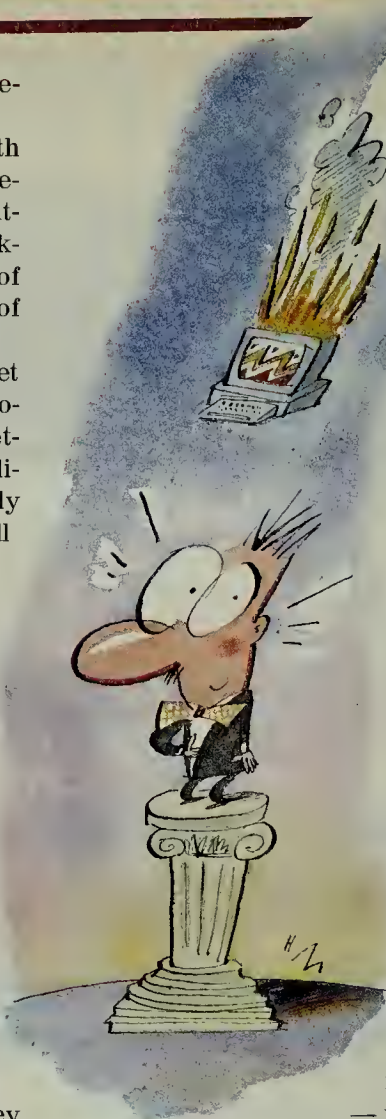
dow to another before they ship a request to the server? Physically, how do you test that?"

One product Fowler is working with now for the kind of benchmark simulation he needs is the Rhobot master controller from Promark in Parsippany, N.J., which enables the user to tailor custom scripts that replicate users keying live data into the system. The vendor is adapting its testing tool to interact with the stock exchange's Unix-based transaction monitor.

## 2 NETWORKING MORE COMPLEX, CRUCIAL

As the lifeblood of any client/server setup, the network is frequently the trip wire for a host of troubles, from bandwidth limitations to inexplicable crashes and data loss. *Client/Server Journal's* survey of 219 users found that 60% of their problems related to connectivity or networking, for example.

"For technical showstoppers, the network is the one I keep running into the most," said Hugh Ryan, director of Andersen Consulting's New Age Systems unit. "Our clients get into this and fail to anticipate the difficulty of upgrading a network, particularly if they are putting in machines



**“In essence, client/server amplifies stupidity. If you're stupid about systems development or design or requirements gathering, you end up far worse, quicker.”**

**WAYNE FOWLER**  
DIRECTOR OF TECHNOLOGY  
AND NETWORK SERVICES  
TORONTO STOCK EXCHANGE

## 4 THE HUMAN FACTOR

When asked what terrible technical trials they encountered on the road to client/server, many information systems executives said technology was sometimes the least of their worries. What tripped them up instead was the human factor — from recalcitrant programmers to reluctant users.

"I'd say our biggest issues were getting people trained in the new technologies, getting them productive and thinking of data in different ways," said Pompei Malik, manager of IS at Brewers Retail, Inc., a \$1 billion beer distributor that manages 450 retail and wholesale outlets in Ontario, Canada.

Rewarding the teamwork required to make client/server development projects a success — while still recognizing individual achievement — is a delicate balancing act, several IS executives said. According to industry surveys, staff turnover during conversion projects averages 35% to 40%.

"The people transition issue just surprised the hell out of us," said Jim Stikeleather, director of systems development at Kash n' Karri Food Stores, Inc., a \$1.2 billion grocery store chain in Tampa, Fla. Its client/server migration sparked a 70% exodus of the mainframe programming staff in the first six months.

In the future, Stikeleather said he may try out an idea passed along by colleagues at a user conference: team up two or three programmers, one of them a "new architecture type" and the others old-school mainframers.

"I think that very intense mentoring will do a couple of things," Stikeleather said. "One, it'll make the transition less scary. They're not learning by themselves. And two, you have built-in bonding so you get constant encouragement and a little hand-holding."

## 5 COUNT ON SOFTWARE GLITCHES

Software-related showstoppers are perhaps the most commonplace of all in client/server shops. According to users, there are still huge holes in the area of system and network management software.

They also cite scalability shortcomings when PC and workstation software goes big-time on a corporate network. And many companies are bedeviled by version control and software distribution

## ASK THE TOUGHER QUESTIONS

Users may be failing to ask the right questions of their vendors, several managers and consultants said. Rather than asking "Can we do XYZ with this machine or that network?" the better question might be: "Would we want to do that? What's the downside?"

At one publishing company, for example, a 20-minute backup operation on the old mainframe turned into an 18-hour ordeal on a Unix-based server running an RDBMS. The vendor promised to fix it — but not until the next version.

problems with multiple packages running on different hardware platforms.

"One of the biggest challenges of client/server is software distribution," said Linda Kern, manager of application development and support services at El Paso Natural Gas Co. in Texas.

"Before you can do heavy-duty client/server for transaction systems, you have to be able to automate that process," Kern said.

At Hickory White Furniture Co. in Highpoint, N.C., migration from a Burroughs Corp. mainframe environment to Unix-based systems from Sun Microsystems, Inc. has been hobbled with a series of problems with third-party software, said Pat Thomas, MIS director at the \$60 million furniture manufacturer. Those difficulties include months-overdue versions of certain software packages, plus inaccurate or incomplete documentation.

Describing his current frustration with open systems, Thomas likened the situation to a "mega-grocery store" where all the canned goods cost 30 cents but not one has a label.

"All the responsibility is yours because you've become the system integrators for your company," he said.

Taking on that job of systems integrator is often one of the rudest shocks involved with client/server, according to Jerrold Grochow, vice president of advanced technologies at American Management Systems, Inc. in Reston, Va. "Invariably, it takes much longer to deal with these issues than anyone thought," he said.

Despite the inevitable showstoppers, however, users and consultants said that even the most difficult projects eventually get done. "Setting expectations and being able to deal with things are part of the management issues in client/server," Grochow noted, "so a problem becomes something to solve rather than a disaster." **CSJ**



The Wide-Area Information Server on the Internet is ready for its commercial debut, as a popular grassroots application comes of age

# THE CASE FOR WAIS

*By Charles Babcock*

**A** new concept in client/server computing, the Wide-Area Information Server (WAIS), is coming of age on the Internet as a way to broadly disseminate information. It offers a promising model for the commercial world as well. These wide-area servers are providing access to databases of public or quasi-public information to any interested Internet user. There is a weather information server run by the University of Michigan, for example, and another that offers the lyrics of any popular song. So far, there are 434 WAIS-based databases out there.

## THE FREWARE CONNECTION

To obtain WAIS client/server freeware, an Internet user can E-mail the following address: [info@cnidr.org](mailto:info@cnidr.org), which is the Clearinghouse for Networked Information Discovery and Retrieval in Research Triangle Park, N.C.

The software is also available by using the anonymous ftp (File Transfer Protocol) command to another Internet address: [sunsite.unc.edu](http://sunsite.unc.edu). Use the path of `/pub/wais` to get to the freeware directory. ■



◆ BREWSTER KAHLE says that while people await the information 'superhighway,' today's Internet has become the well-traveled 'dirt road'

"What people are looking for is the information superhighway. What we have is an information dirt road, but it's working," said Brewster Kahle, who created the Internet's first WAIS while working at Thinking Machines Corp. in Cambridge, Mass.

Some Internet users—including Kahle, who last year founded a private company, WAIS, Inc. in Menlo Park, Calif., to sell wide-area client/server software—are confident there is a commercial future for the wide-area network server. One scenario is that a new form of publishing business will be established to make vast quantities of information available at a fee through WAISs.

**COMPANY BLUEPRINT** "Access to reference information is extremely useful in the business world," noted Dan Goldman, spokesman for Perot Systems Corp. in Reston, Va., an early WAIS, Inc. customer.

WAIS provides a blueprint of how companies could make reams of standard, up-to-date information available to their employees. Lawrence Livermore National Laboratory in Livermore, Calif., is putting its management guidelines and health and safety rules onto a server that will be accessible to those who need it at the 8,000-employee facility, said David Grubb, a member of the lab's administrative information systems staff.

The Internet examples of WAIS are necessarily public information servers and open to any Internet user with the means to access them. But a business seeking to create its own WAISs has several options for keeping them closed to

employees or restricted to groups with the appropriate access privileges. Livermore Laboratory's in-house information, for example, will be placed on a server that is screened off the Internet by a router placed in front of it, Grubb explained.

Any business with a WAN can theoretically build databases and make them available on low-cost servers. WAIS also offers the opportunity for more direct information sharing between companies and their customers. Sun Microsystems Inc., for instance, has established a customer support database at the University of North Carolina. Customers can turn to that server for help before tapping more conventional forms of support, which in turn helps hold down costs for Sun.

Wide-area server capabilities came about through an early effort to automate library and other research text exchange over great distances using the Z39.50 protocol, which managed computer-to-computer links over a WAN. While at Thinking Machines, Kahle built the WAIS on top of the protocol to create a user-friendly approach to the wide-area server.

Mimicking the searches of large text management systems, Kahle created a search mechanism using key words typed in by the user. The search returns a list of documents to the user, with those scoring the most keyword hits listed at the top. By selecting those that are most pertinent, the user can direct the process through a feature built into WAIS called "relevance feedback."

CSJ

Babcock is *Computerworld's* technical editor.



# 'OPEN' SECURITY:

**Client/server design promises easy access to reams of critical information. Yet it also ushers in new ways for intruders to gain access and lose data. Here's how to cope.**

*By James Daly*

It's enough to give the most stouthearted information security chief the willies. Thousands of PCs and workstations with dissimilar operating systems spread across an organization, connected to networks, minicomputers and mainframes in other locations, sometimes across states or countries.

It's also a reasonable description of a client/server environment.

The wide distribution and easy access to critical information, which has many users salivating over the prospect of establishing a client/server network, is already proving to be a nightmare to those trying to secure that data. Open networks mean new channels through which data can be lost and intruders can gain access.

"It's a whole new ballgame right now," said Brian Redler, director of security and operations at National Securities Clearing Corp., a financial service firm in New York.

Providing security in a widely distributed client/server design is different — far different — from the mainframe-centric, centralized security planning of the good old days. For one thing, many of the tools needed for the job are simply not there yet. "The approach right now is to cut and fit with what's available and, to tell you the truth, the fit isn't always that good," said Fritz Wagner, manager of corpo-

Daly is a *Computerworld* West Coast senior correspondent.

rate electronic information security at Du Pont Co. in Wilmington, Del.

Managing a mixed-platform client/server environment also means managing a lot of user confusion about things such as identifications, passwords, log-on sequences, data encryption and access privileges.

Yet information systems security chiefs need to get their hands around the issues — and fast. Some security experts say that protection of the electronic access to corporate resources may prove to be *the* most important issue in the next phase of client/server architecture development.

Consider the cost of letting down your guard. The Communications Fraud Control Association estimated that losses caused by unauthorized access to computer and telephone systems last year exceeded \$500 million in the U.S. and more than \$2 billion worldwide.

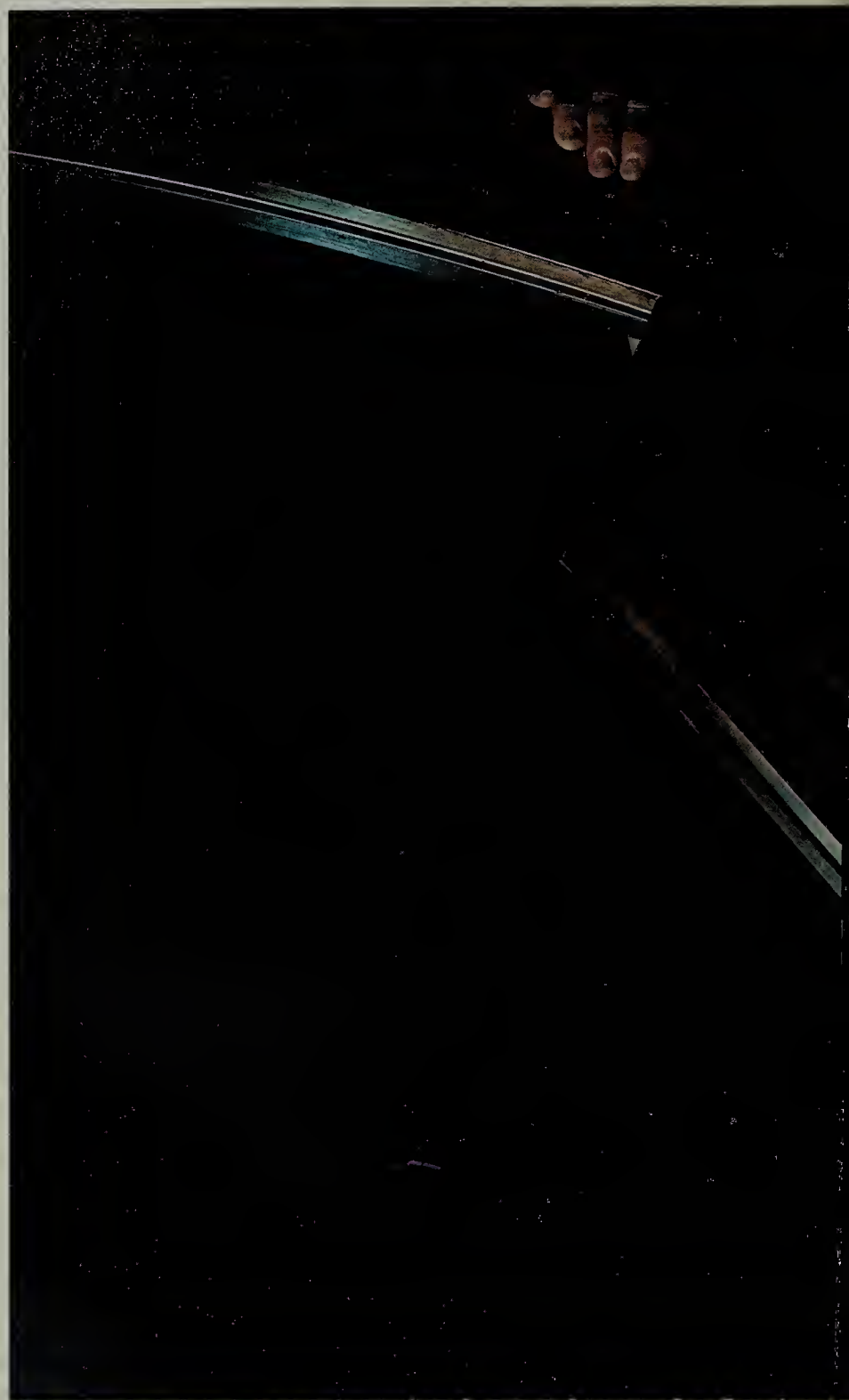
In another study by the University of Texas at Arlington, 43% of the companies that lose a major portion of their data via a major disaster (be it hacker or hurricane) will never reopen. And 90% will be out of business within two years.

"We're at the end of legacy systems and the beginning of broad distributed systems, so it's a critical time for people to plan for these things," said Bill Lowery, a manager at Toolmaker, Inc., a systems integrator in Bellevue, Wash.

Still, it won't be easy. Securing a client/server environment is like throwing mud at the invisible man — it may be messy, but pretty soon you get an outline of what you're up against.

**RAISE AWARENESS** Information security chiefs need to burrow into the client/server design process as soon as possible. "Computer security is still a difficult point to get across," said Jack Skalon, a network specialist at the University Hospital Consortium in Oak Brook, Ill. "People need to know security is not a joke."

Chief executive officers and top managers also need to play a more active role in planning data security, which some experts say is one place where early mistakes are made. "Sometimes I think that security administrators need to go to a Dale Carnegie course and learn



♦ DU PONT'S FRITZ WAGNER says users must step up to the controls when it comes

## SECURITY PRODUCTS

How do users rate their client/server products?

**8%** Poor  
**24%** Fair  
**34%** OK  
**18%** Good  
**2%** Excellent  
**14%** Other/Don't know

What security tool would users most like to have?

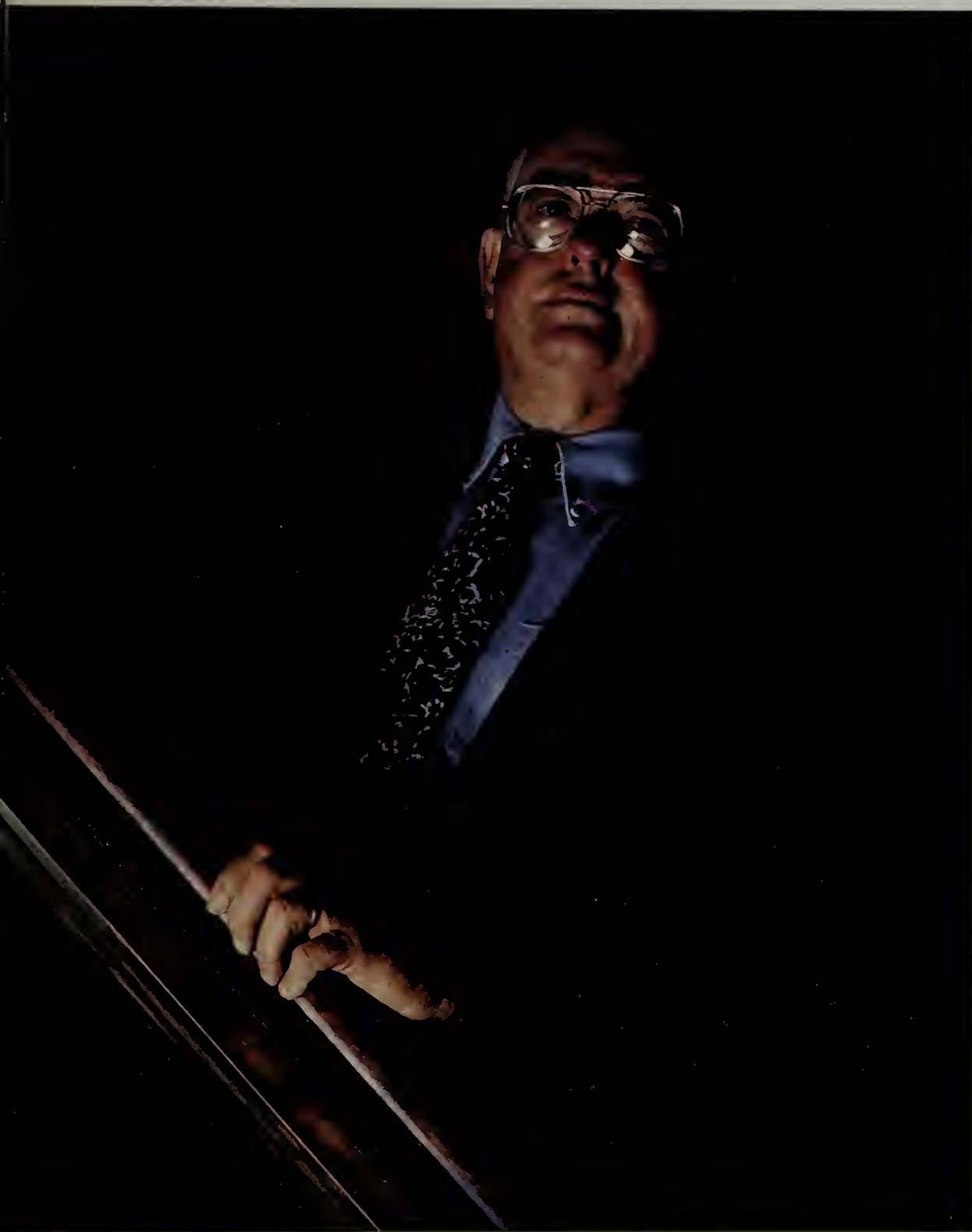
**58%** Cross-platform security products  
**43%** Single sign-on network-access devices  
**43%** Telecommunications security packages  
**38%** Virus protection packages  
**20%** Data encryption devices

RESPONSE BASE: 219

RESPONSE BASE: 219  
 \*MULTIPLE RESPONSES ALLOWED



# RESOLVING THE PARADOX



Nick Welch

to security — and not leave it solely up to the IS department

how to better sell their jobs to their managers,” said Cheryl Currid, president of the Currid & Co. consultancy in Houston and director of information technology at The Coca-Cola Co. for eight years.

Several user groups are involved in client/server security. These include SAFE (Security Alliance for Enterprise), a recently formed voluntary group dedicated to enhancing the security of Unix-based networks, and New York-based OURS (Open User Recommended Solutions), a relatively new user group.

Security awareness must likewise be passed to the user community. “We’re distributing the resources, and we’re also distributing the responsibility,” Wagner said. “The IS guys can’t

do it all. Users need to take control of their own environment.”

#### FIT NEW SECURITY DESIGNS INTO OLD ARCHITECTURES

“Just because you decentralize the computers doesn’t mean you decentralize all the security administration,” Currid said. “We went through an enormous decentralization process, splattering data from one mainframe onto 50 servers. But we did not decentralize security. It ended up being put in the hands of more than one person, but we did not give every Tom, Dick and Harry the keys to the computer.”

The new distributed function may create a need to hire more security employees. That happened at Mastercard International, Inc. in

St. Louis. “We found that we needed to bring more people in just to keep up the same level of security,” said Tom DeWald, manager of technical development at Mastercard.

**CONTROL FILE ACCESS** Illegally accessing systems is quite easy. “I can get into nearly any corporate network just by tapping in numbers randomly,” said Robert Schiffreen, a hacker-turned-security consultant who once broke into Prince Philip’s electronic-mail file in England. “People just leave their IDs and passwords lurking around. It isn’t all that hard.”

**START WITH THE BASICS** The most promising line of  
**SECURITY, page 26** ♦

## SWAPPING SECRETS

**L**ike secret agents meeting in a dark corner of Gorky Park, computer users on a network must be certain of one another’s identities before they can confidentially exchange information.

One of the primary data authentication standards for open computer networks is Kerberos, which was developed by MIT. Kerberos requires users to exchange secret messages that prove their identities to one another, while concurrently preventing unauthorized parties from eavesdropping on data that is on the wire.

Kerberos allows its users to identify themselves and verify their identities with secret key encryption technology. These credentials, called tickets, contain user information such as name and location.

In addition, Kerberos provides the principals with a secret key, which they use to exchange confidential messages. Possession of the secret key, which allows each party to encode and decode the messages, constitutes verification of the credentials.

For example, a national sales manager might want to dial into a database to see which region is burning up the boards on widget sales. Before the database service complies with that query, it must verify the sales manager’s identification.

Kerberos is not without its critics. They say it requires tremendous technical knowledge. End users, however, may be desperate for the software standard no matter what the cost. Kerberos has the endorsement of the Open Software Foundation, and some 700 user companies are implementing pilot programs based on the security standard. ■

**Ways to stand guard over corporate data: Raise user awareness; control file access; back up critical data; and beef up your company’s security ranks**



# IBM Client/Server



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“IBM helped us move as fast on the ground as we do in the air.”

*John Harper, Sr. Vice President—Information Services, USAir.* USAir wanted

to create the terminal of the future at Pittsburgh International Airport. A place where lines

would be shorter. Where baggage handling would be quicker and more dependable. And

everything from check-in to take-off would be easier and less confusing for travelers.

So IBM helped USAir develop a tailor-made system that makes information more readily




available to employees so they can be more responsive to customers. A system that maximizes the power of PCs and integrates a wide range of different manufacturers' equipment.

A classic example of IBM Client/Server.

Information is now distributed from the mainframe to 650 PS/2<sup>®</sup> workstations running OS/2<sup>®</sup>. These workstations are tied into hundreds of ticket and boarding pass printers, touchscreens, credit card readers and other peripherals supplied by a number of companies.

The result: USAir employees and passengers now get immediate, consistent and reliable updates on pertinent information. Skycaps use touchscreens and bag-tag printers to streamline curbside check-in. And tower operators can make better decisions about managing gate traffic, resulting in fewer delays. In short, the airport of the future.

If you want a custom-tailored solution that gives your people more flexibility and gives you an edge on your competition, IBM Client/Server is the answer. For more information, call 1 800 IBM-0045, ext. 20.

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**SECURITY, from page 23**

attack for interlopers seeking access to data on a network is a networked workstation. These must be protected carefully. Restrict access and power-up to workstations through keys, identification cards, smart-cards or biometrics.

The network administrator might also want to classify network users in order to impose the appropriate level of security. The following is a suggested three-level system:

- Administrative users who design, maintain and run the network — likely to be a small group of support and managerial staff.
- Trusted users whose work benefits from greater freedom of access to the network.
- Vulnerable users — those who do not have the need to access secure data.

Proper access control requires that authorized users have considerable ease of access, while non-authorized users have difficult access. Striking that balance — between a system secure enough to protect data but not so tightly locked as to hinder user access — remains “one of the trickiest parts of the job,” Redler said.

**AUDITING** Once you’ve got everyone under control, it’s time to start keeping tabs on who is doing what. A computer file or printed report that lists attempted access is an excellent warning system that lets you know if data is under attack.

Keep a chronological log of all events that occur on the computer system. Log all workstation activity, identified by user identification, and make this feature known. The fact that all access is recorded is in itself a great deterrent to wrongdoing.

Auditing should be frequent because some types of intrusion can go undetected for a long time otherwise. One threat-monitoring system is concurrent auditing, which provides continuous monitoring and reporting of unusual activity, including variances and exceptions to company policies and procedures.

**CRYPTOGRAPHIC CONTROL** If information is accessed illegally, make sure it will be useless. Typically, this means that the data in the file is encrypted using some form of password as a key. Only authorized users can de-encrypt the data, using the secret password.

Encryption is a rule that should be enforced, especially for all communication to and from the host computer and especially for top-secret messages. There are many good products on the market for doing this, ranging from rudimentary third-party vendor applications to the super-sophisticated

**SECURITY THREAT—  
AN INSIDE JOB**

The greatest client/server security risk is on the:

- 45%** Desktop client platform
- 41%** Network
- 14%** Server platform

The greatest security threat is from:

- 67%** Inside the company
- 30%** Outside the company
- 3%** No opinion

The biggest source of data loss is:\*

- 42%** Inexperienced users
- 24%** Database crashes
- 15%** Electrical surges
- 5%** Computer viruses
- 2%** Fire or natural disaster
- 12%** Other/Don't know

RESPONSE BASE: 219  
\*MULTIPLE RESPONSES ALLOWED

Data Encryption Standard used by the government.

**BACK UP CRITICAL DATA** A client/server design is actually a good tool for avoiding a total information systems loss. “In a decentralized environment, you actually have a better chance of recovering from a disaster faster than you do in a mainframe environment because it’s very, very unlikely that you will ever lose the whole system at once,” Currid said.

But that doesn’t mean you’re out of the woods. Backing up data in a decentralized environment can be tricky, according to Herb Edel-

stein, a principal at Euclid Associates, a Potomac, Md.-based consultancy. Edelstein noted that databases sometimes exist on multiple servers, which often have different backup regimens. His suggestion: Centralize the servers where they can be controlled by systems administration staff.

**SIMPLIFY, SIMPLIFY...** The very nature of a client/server design requires tying together multiple operating systems, each with separate access codes and passwords. But what will you do — sacrifice security to simplify it?

One solution is a single sign-on security package (see story this page). Using such an application makes moving through a complex, mixed-platform environment as easy as remembering one personalized password. For IS managers, these packages also offer an easy way to distribute security from a central location.

“You can have the best system in the world, but if everyone is pasting their passwords on the side of a terminal with little yellow sticky notes, it doesn’t mean very much,” said Peter Wild, an EDP audit manager at Melville Corp. in Rye, N.Y.

Most of the single sign-on products on the market create a restricted access “security kernel” on each PC that contains (in encrypted form) all the usual passwords, identifications, log-on sequences and authorizations required to access individual systems. When users try to attach to a particular system, the sign-on product prompts them for their single passwords and checks their access privileges for that system before logging them on.

“Ultimately, we’d like to have security be almost invisible to the end user, but we know that’s not always possible,” said Ray Mueller, president of Management Information Support, Inc. in Lakeland, Colo. “But either way we know we have to be secure. If not, we’re sunk.”

CSI

**SECURITY PRODUCTS**

When shopping for security products to meet your company’s needs, the classic advice “Let the buyer beware” is the best advice of all. The following is a brief sampling of the many dozens of products available for a distributed environment. Prices range from \$250 to several thousand dollars.

♦ **Single Sign-On Data Access Control Systems (DACS)** from Mergent International, Inc. in Rocky Hill, Conn. Allows users to travel through various networks and gateways with only a single password. Provides centrally managed security control.

♦ **SAFE Single sign-on application** from Fifth Generation Systems, Inc. in Baton Rouge, La. Creates restricted access security kernel on individual PCs and can create and distribute security kernels from a centralized location.

♦ **The Eagle Network Isolator** from Raptor Systems, Inc. in Wilmington, Del. Lets you specify, on a per-machine basis, exactly what kinds of communications will be allowed and when they will be permitted.

♦ **The Enterprise Security Manager** from Hughes STX in Vienna, Va. Places the entire enterprise under centralized control.

♦ **LeeMah DataCom Security Corp.** in Hayward, Calif. Provides a range of access control products and personal authentication devices.

♦ **The Network Security System** from Semaphore Communications Corp. in Santa Clara, Calif. A family of hardware and software products that control access and protect data as it travels from source to destination over both local- and wide-area networks.

— by JAMES DALY

**NETWARE: SECURE AT LAST?**

In October 1992, Novell, Inc. got a disturbing call. The kind of call that makes you feel like you just swallowed a brick.

A student at Leiden University in the Netherlands discovered that with a little tinkering, any user with an easily attainable NetWare server account could gain access to any other user’s file.

The chilling potential of that security gap led to NetWare 4.0, released in March of this year, which Novell officials claim is their most secure product to date. That’s a given — network security was virtually nonexistent on Version 3.0.

The updated NetWare packs in security features from a password integrity checker to data encryption techniques and audit trail service. A directory services utility provides a simplified way to grant and manage the security privileges of global network users.

Version 3.0 also restricted the ability of the system administrator to delegate responsibility to subadministrators. Version 4.0 provides a more flexible approach, allowing the system administrator to grant a subadministrator specific authority to perform certain functions while withholding others.

In addition, an authentication service also verifies the validity of a user’s identification, using RSA Data Security, Inc.’s encryption key technology. A client’s signature, the basis of authentication, is valid only for the duration of the current session. The signature itself is never transmitted across the network.

Prior to Version 4.0, NetWare provided customers with security implementation services in the areas of administration, authorization, access control and assurance. Auditing services were limited but were provided through third-party products.



# WHOA! Network traffic ahead

**Managers try to regain control as client/server applications wreak havoc with communications bandwidth and user response times**

*By Joanie M. Wexler*

**C**ompanies splintering their data processing across far-flung, shared computers have discovered that the networks gluing these distributed machines have the power to single-handedly ambush the most well-intentioned client/server efforts.

Consequently, information systems departments are learning—some the hard way—that the care and feeding of a corporatewide network is a science in itself.

“Everything in client/server computing depends on the network,” asserted Raymond Perry, vice president and chief information officer at Avon Products, Inc. in New York.

Perry has added three people to his networking and hardware staff

to manage five relatively new client/server applications, including a desktop publishing system for designing Avon’s weekly products brochure.

“Just keeping the network operational while adding and removing workstations is a significant task in itself,” Perry said.

The IS department, which was largely left out of the loop as pockets of local-area networks sprang up around the corporation, is now finding itself charged with preventing a single hiccup in what has grown into sprawling internetworks. This task means ensuring that the network—which is continually expanding and changing—is rock-solid reliable, delivers the predictable response times that terminal-to-host users have

come to expect and does not drain the corporate coffers.

IS groups are tackling these challenges in a variety of ways, ranging from looking to technology for managing network bandwidth to reorganizing their staffs.

For example, when JC Penney Co. in Dallas began deploying client/server applications, “what really killed us was NetBIOS,” said Jim Ducatelli, manager of advanced information technology. NetBIOS, a LAN protocol upon which many client/server applications sit, broadcasts itself across the entire network each time a session is opened, he explained.

JC Penney added one NetBIOS-based application too many, Ducatelli said, and “all of a sudden—boom! Links started to congest, and response times dropped.”

In addition, the widely used Transmission Control Protocol/Internet Protocol (TCP/IP) “has

tremendous overhead” that can clog the network, Ducatelli said. “It’s much larger than that of SNA [Systems Network Architecture] because TCP/IP was designed for a global environment, and SNA was designed for just one.”

**HOPING TO COUNTERACT** these ill effects, JC Penney is working with its router vendor, Cisco Systems, Inc., to activate appropriate router filters that suppress such needless traffic from traversing the internetwork.

Until networks simply become fast, cheap and widespread enough to accommodate whatever traffic loads users decide to pump onto them, vendors are coming up with innovative interim technologies to help users control their bandwidth (see story page 28).

**WHOA!** page 28 ♦

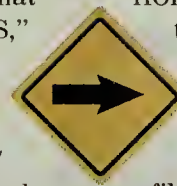


♦ **KEEPING THE CORPORATE NETWORK RUNNING** while adding and removing devices is a major challenge on its own, says Avon CIO Raymond Perry

## WIDENING THE HIGHWAY

Data superhighways are opening up now to network services that accommodate client/server computing. A key component is Synchronous Optical Network (Sonet) technology, a very fast fiber-based communications platform. Some Sonet projects in the works now include the following:

- A \$240 million, 12-state effort by GTE Telephone Operations to install 50 Sonets in 1993 and 1994.
- A \$4.4 million endeavor in North Carolina for a statewide government, educational and medical network. Initial services are expected in mid-1994.
- “Private” citywide Sonet installations by the city of Milwaukee and Chicago-based Commonwealth Edison.
- Efforts by New York Telephone to build a regional network linking medical, manufacturing and research and development communities that will eventually connect to the public telephone network.





from page 27

One large company saw that "sloppy" application development could result in unexpected bandwidth demands by putting unneeded data on the network. Thus, development and network people at Convex Computer Corp. have joined forces to make sure "the correct processing is done in the correct location," said Coyne Gibson, manager of information technology at the Richardson, Texas, firm.

"Our database administrator is now part of the information technology group. He understands what's going on with both the network and the database and can communicate network issues to the developers," Gibson said.

Michael Millikin, a vice president at Interop Co., a Mountain View, Calif., company that provides trade shows, conferences and tutorials on how to build, operate and manage heterogeneous networks, agreed that the network administrator/developer liaison can be useful.

"The protocols and application interfaces you use all have bandwidth implications" that developers need to know about, he said. Millikin added that today there are not many good guidelines available for figuring out "what part of an application should run on what processor."

**T**he overhead with NetBIOS, a 'chatty' LAN protocol, can gobble up your network resources.

Needham, Mass.

In a distributed computing environment, when a user hits the enter key on his client workstation, "queries can be off to multiple servers and may consume MIPS in a variety of processors," he said.

In the client/server world, this traffic is tougher to get a grip on than in the mainframe world, where IS could install a line monitor next to a front-end processor and measure how long it took traffic to go in and come out, Vandervoort noted.

To plan for bandwidth consumption in the shadow of fickle client/server applications, Kash n' Karry Food Stores, Inc. "greatly simplified how the network was constructed," said Donald E. Rimel Jr., a quality engineer at the Tampa, Fla.-based company. This entailed eliminating routers and bridges, creatively segmenting networks, direct-connecting servers to a 100M bit/sec. Fiber Distributed Data Interface (FDDI) backbone and installing X Window System display terminals, Rimel said.

Kash n' Karry had experimented with some internetworking devices, "but we immediately got a lot of traffic all over the place, which had a strong negative impact to the organization. Collisions went through the roof, and response times went down," Rimel said.

While bridges and routers allow network segmentation with better performance per segment, they create additional sources of overhead, he explained. For example, while the development team was doing multimegabyte compilations over the network, a word processing user would move his mouse around and "see the screen stutter," Rimel said.

Kash n' Karry subsequently isolated the developers onto their

own Ethernet with a connection to the FDDI and gave them X terminals, which transport only display traffic across the network instead of entire files. Processing of files in the X world is done on the host computer, not the desktop.

Meanwhile, the response-time challenge to IS is getting even trickier as internetworks grow across wide-area telecommunications links — traditionally orders of magnitude slower than LAN speeds.

The good news is that "broadband" wide-area networks, such as Asynchronous Transfer Mode and Switched Multimegabit Data Service, which run much faster than most of today's LANs, are emerging to handle aggregated LAN traffic.

**BUT UNTIL THESE** roomy data highways are widespread and economical, users such as JC Penney are turning to internetworking vendors for technologies, such as compression, traffic filtering and prioritization, that help them conserve and manage bandwidth.

Ahlstrom Pyropower, Inc., an engineering and construction firm in San Diego that is moving its PC interrogation program off the host and onto the PC, summed up the client/server challenge this way: "Client/server represents change, and change is the enemy of reliability," said Michael McEwen, manager of IS. "Some people are buying new servers just to run client/server," and adding resources and changing application dynamics means congestion problems, he said.

CSJ

Wexler is a *Computerworld* senior editor, networking.

## Rx for network stress

To alleviate overworked network bandwidths, router vendors offer compression, filtering and traffic prioritization techniques on their products. Compression lets users squeeze in up to 10 times more traffic, while filtering schemes flush out bottlenecks by shunting user-identified "garbage" onto wide-area links. Prioritization gives certain types of traffic clout over others.

Swiss Bank Capital Markets and Treasury in Lisle, Ill., has looked beyond router capabilities to a smart device called the Datamizer IV from Symplex Communications Corp. The Datamizer was specifically designed for bandwidth management.

Aside from sophisticated compression, it plays sentry against network outages: The moment it detects one, it will reroute traffic over a backup line.

It will also monitor T1 lines for congestion and bump voice traffic off to the public switched network in favor of data when necessary. Swiss Bank said it postponed new WAN bandwidth investments for at least six months when it merged with The O'Connor Partnerships last year because of the efficiencies it gained with the Datamizer.

Other tactics for handling the flood of network traffic caused by distributed computing include the following:

- **LAN SWITCHING HUBS:** These network segmentation products from the likes of Alantec, Kalpana, Inc. and Synernetics, Inc. deliver full LAN bandwidth to an individual user or a heavily accessed network resource, such as a server. This precludes growing numbers of resources from contending for a fixed amount of bandwidth but allows them to maintain existing investments in LAN adapter cards. Such capabilities are also showing up as modules in smart wiring hubs.

- **INVERSE MULTIPLEXERS:** These devices let applications dial up public network services on demand, rather than paying for dedicated bandwidth that can sit idle much of the time.

## GETTING A GRIP

These technology areas help network managers keep bandwidth issues in check as networks grow to support client/server applications

### ROUTING

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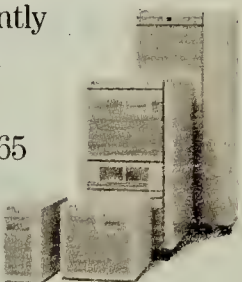
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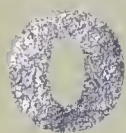
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# Client/server + object technology = BUSINESS INNOVATION



Over the years, the information systems industry has seen many technological innovations, each presented as "the coming thing," capable of solving all problems. On-line systems, structured methods, fourth-generation languages, CASE, relational databases — each was introduced with the fanfare of an old-time medicine show, and each, somewhat like a patent medicine, had its good and its ill effects.

More recently, client/server computing and object technology have arrived on the scene, like previous innovations, with an excess of fanfare and hype. But something is significantly different this time: the synergy of client/server and object technology.

That difference is evident in the amount of money being spent by organizations large and small, and by the rate at which major end-user companies are adopting these approaches. These innovations are attracting more attention than any others I've seen during the past 25 years.

While client/server may be the



Kathleen Lambert

**Distributed object computing is still a few years away, but it promises to solve real business problems.**

latest buzzword for distributing an application and its data over more than one computer, it has actually taken almost 20 years for this architecture to make its way into the world of strategic business systems.

Object technology also got its start at least 20 years ago, as its basic ideas can be traced back to the Simula programming language in the late 1960s.

What lies ahead now as the really exciting innovation, however, is combining object technology and client/server. The distributed computing architecture is provided by client/server, while objects supply the appropriate modular units to distribute.

I'm not just talking about applications that run on PCs and store their data on separate database servers, but rather true "distributed object computing," where multiple computers participate in providing a computing function. The objects (data and processes) on one machine transparently inter-

act with objects on other machines.

It is this combination of client/server with object technology that provides maximum flexibility to adapt applications to changing business conditions. One can scale hardware configurations by the needs of different business units (via client/server) and vary the location of computing functions based on network performance (via objects).

Different human-to-computer interfaces can also be supplied to different classes of users (via client/server and objects).

Today, we regularly implement object-oriented applications that employ a database server. We also implement systems where one object-oriented application communicates with another using standard communications protocols.

But developing an object-oriented application that is itself spread across several machines is still an experimental effort. This type of distributed object computing requires the services of a distributed object request broker, a technology that is just starting to emerge

in the marketplace. The distributed object request broker allows objects to pass messages to each other without regard to where (on what machine) they are located.

While there are examples of distributed object request brokers implemented as components of commercial applications (for example, in NCR Corp.'s Cooperation desktop environment), general-purpose, cross-platform technology is just now making an appearance.

Given the relative immaturity of

both client/server and object technology (at least in the realm of strategic business systems), much of the work going on in distributed object computing is still in its early days.

While there have been some notable successes, it will be two to three years before we see ongoing use of this technology in high-reliability, high-performance, business computing environments.

Yet with its potential of eventually solving real business problems, the combination of client/server and object technology may be just the medicine we have been waiting for.

CSI

*By Jerrold Grochow*

Grochow is vice president and chief technology officer of American Management Systems, Inc. in Reston, Va.

## Dealing with disaster planning, legacy data and NT

### STRATEGY SNAPSHOT

**MIORA SYSTEMS CONSULTING, INC.**

Access control and virus checking are not the only client/server security issues to worry about. Companies need to plan for physical threats to their networks as well — from fires to disgruntled employees, said Michael Miora, president of Miora Systems Consulting, Inc. in Playa Del Ray, Calif.

Client/server systems should be considered secure only if they can be reassembled or regenerated after a natural or man-made disaster, Miora said. This business resumption planning means backups for the following:

- **Equipment:** Detail all the necessary hardware and software to run your business, including network software and equipment, printers and remote connections. Don't forget telecommunications equipment, fax machines, modems and EDI connections.
- **Data:** Off-site backups of data are needed. Make sure to include both data on servers and any necessary data on local drives or floppy disks. "You have to have a strategy to save all your data," Miora said.
- **Locations:** Find suitable sites to rebuild the needed parts of your client/server system. To back up equipment without huge expenditures, Miora recommends that users negotiate an agreement with their computer resellers for 24-hour replacement equipment — or consider using one of the company's other locations as a repository for extra equipment.

### STRATEGY SNAPSHOT

**LEBHAR FRIEDMAN, INC.**

For the information systems division of Lebhar Friedman, Inc., converting to client/server was not just a matter of switching hardware. When this publisher of industry directories in Tampa, Fla., moved its databases from dBase III files to Microsoft Corp.'s SQL Server, it discovered that

converting data can be an enormous project. "We spent between 25% and 40% of our conversion on converting data," said Lewis Katz, corporate director at Lebhar.

The firm needed to move more than 50 databases from an old publishing system database and that meant 500M bytes of legacy data needed to be normalized and validated, with dead records removed.

The four-step process used was to:

1. Define old data and create a data analysis specification on the old database. Run any old programs associated with the data and define program requirements.
2. Load data into SQL Server. Translate the data into a SQL database and analyze the data that was loaded.
3. Develop data reports and interface. Conduct additional checks for inaccurate or missing data. Create a user interface to examine and control data.
4. Get user feedback, asking them to analyze the data from both negative and positive aspects.

### STRATEGY SNAPSHOT

**EL PASO NATURAL GAS CO.**

Although much of its business is still tethered to a Wang Laboratories, Inc. VS10000 minicomputer, El Paso Natural Gas Co. is moving briskly toward open client/server computing as it builds a network running Microsoft Corp.'s Windows 3.1 and Windows NT.

After rejecting both Unix and OS/2, El Paso settled on NT last year despite the concerns about its stability and robustness. "We've had our problems, but the beta version we have now is stable," said Linda Kern, manager of application development and support services at El Paso, which transports gas over its pipelines for other gas marketers.

The network now under construction will eventually rope together the gas company's 1,500 PCs. By fall, the plan is to have several production applications running under NT, Kern said.

The company used Powersoft Corp.'s PowerBuilder to develop reporting applications that allow customers to schedule gas on the company's pipelines and graphically see an analysis of their request.

"A strategic advantage for our client/server software is its flexibility," Kern said. "We can deploy the programs that we're developing in the different environments that our customers need," such as OS/2, Unix or Windows.

David A. Kelly is a free-lance writer in West Newton, Mass.



# Decision time

**Choosing the right apps for client/server involves everything from user demands to data needs**



*By David Baum*

**T**he decision to move an aging mainframe application to client/server was far more than a flip of the coin for Terry Longoria, deputy director at Napa County's Department of Health and Human Services in Napa, Calif.

Her department needed to update a cumbersome welfare application that was running on a Unisys Corp. 2200 mainframe. Users were complaining about how difficult it was to use—but at least it worked.

Longoria wondered whether a new client/server architecture, sporting PCs for front-end screen navigation and processing, would really make that big of a difference. In the end, it was the users who won the toss.

"They're familiar with word processing programs. They're familiar with spreadsheets," she explained. "Adding a similar interface to our welfare system puts us in line with the strategic direction of the industry."

That decision also made good business sense, said John Rymer, an analyst at the Patricia Seybold Office Computing Group in Boston. Whenever data-entry clerks are moving frequently among five or more screens and their work involves checking and cross-checking of data, Rymer said a desktop PC with a well-

signed graphical user interface (GUI) can boost productivity.

Such was the case with Napa's welfare system, which monitors continually changing government regulations. The first step was to replace desktop terminals with PCs, using Unisys' Designer Workbench to build graphical front ends for existing Unisys mainframe applications. Longoria and her team created a Windows interface that automatically navigates users from screen to screen, reduces key-strokes and handles data validation and reporting functions.

While it is still too early to tell whether the change will significantly increase user productivity for Napa County, the experience there reflects some of the key guidelines that determine when client/server is right and when a traditional host-based environment still makes better sense.

**DISTRIBUTION OF PROCESSING** Ultimately, the major factor in putting any computing architecture into place is what type of information is required, where it will be processed and where it can be optimally stored.

"We try to place our users on either side of the decision-support line," said Keith Therrien, an independent consultant and software architect at Arkwright Mutual Insurance Co. in Waltham, Mass. "When workers have complex processing to do, such as calculating premiums and adjusting insurance claims, it makes more sense to have the capabilities of a PC. But if there isn't need for much processing at the desktop, it is hard to justify the extra expense."

Arkwright is midstream in its voyage to client/server, making tools that can combine old and new technologies a primary consideration. The company found that the SmartStar product set from SmartStar Corp. was a good fit, Therrien said, because it enabled Arkwright to create a consistent presentation layer for both character cell and GUI applications.

Therrien said his team decides whether or not client/server is appropriate on a case-by-case basis. For intensive heads-down data entry, why bother users with all that pointing and clicking, he asked, or developers with splitting application logic between client and server nodes?

But some cases are not so clear-cut. "There might be an instance in which you are doing a little bit of front-end process control, and a lot of data entry," he noted. "Architecturally, it could go either way."

In these cases, it is usually the cost that clinches the decision, or the user vote. Many users have grown weary of the mechanical constraints of command-line syntax and are begin-

**DECISION TIME**, page 34

## SOME APPLY

Are there legacy applications well-suited for client/server?

<b>YES</b>	<b>50%</b>
<b>NO</b>	<b>43%</b>
<b>DON'T KNOW/OTHER</b>	<b>7%</b>

RESPONSE BASE: 219

## SOME DON'T

What types of applications are unsuitable?

<b>BATCH/DATA ENTRY</b>	<b>39%</b>
<b>REAL-TIME DATA ENTRY</b>	<b>28%</b>
<b>DECISION SUPPORT OR EISs</b>	<b>16%</b>
<b>FINANCIAL ACCOUNTING</b>	<b>9%</b>
<b>DON'T KNOW/OTHER</b>	<b>8%</b>

RESPONSE BASE: 109

Source: CW Client/Server Survey



DECISION TIME, from page 33

ning to ask why the applications they use at the office cannot be as flashy as the ones their kids are using at home.

**WHERE IS YOUR DATA?** Yet even when split-logic client/server applications make good architectural sense, a common complaint is lack of facilities for database and network management. With client/server applications, data may be spread across multiple servers, and applications must understand different transport protocols to distribute information.

"This [problem] is overwhelming us," said Tom Runkle, North Carolina's deputy state controller for information resource management. "One of the promised benefits of client/server is simultaneous access to multiple databases. But we find it very difficult to coordinate data from many different departments and agencies. What we haven't ironed out yet is the data administration side: What data do we have? What does it mean in this application over here or over there? Where does it come from? When is it updated? How accurate is it? This has become our Achilles' heel."

Such complications lead many information systems pros to question the "cure-all" mentality be-

hind so much of the client/server propaganda sweeping the industry today. "PCs and workstations can provide wonderful analytical capabilities on the desktop," said Ed Toben, director of IS at Colgate Palmolive Co. in New York. "But in some cases, the sheer magnitude of the data processing requirements indicate that a large, centralized system is a safer bet."

**STAFF EXPERTISE** Another crucial point to consider when determining the viability of client/server for large projects is staff expertise.

The client/server world seems to be more the province of people migrating up from PCs than those migrating down from mainframes, said Kent Failing, president of Computer Design Professionals, a consulting firm in Atlanta. "That makes me uncomfortable. There are certain considerations that mainframers will bring to a project that PC people won't — things like data protection and validation," he explained.

Unfortunately, many of the PC-oriented client/server development tools aggravate this problem by neglecting to enforce design methodologies or project management disciplines. While this is not a problem when developing smaller, tactical applications, it is an issue with mainstream, mission-

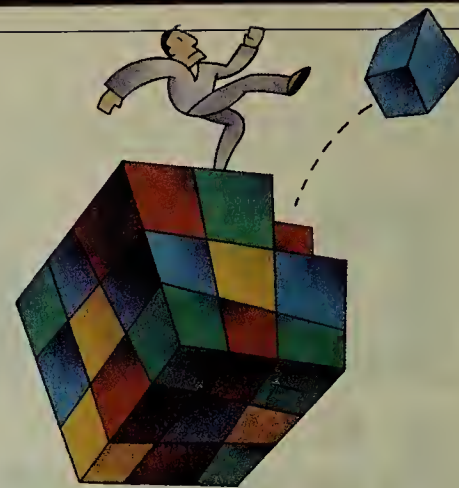
critical systems. Corporate developers stress the importance of working from a data model in which all objects and attributes have been carefully defined.

Vendors of client/server development tools recognize the problem, and many of them are establishing links to computer-aided software engineering (CASE) products to remedy it. For example, PowerBuilder from Powersoft Corp. can now make use of a logical data model as the foundation for applications.

More sophisticated development products, such as SmartStar's SmartStar Vision and The ASK Group, Inc.'s Ingres/Windows4GL, offer more intimate links to CASE tools, which enables developers to automatically populate a repository from a previously defined data model.

There is no shortage of tools, and tool vendors are scrambling to address the remaining challenges. Despite some lingering skepticism, most IS managers are eager to put client/server into practice. Like Napa County's Longoria, once a critical project comes along that can justify the expense, they are inclined to make the leap. **CSJ**

Baum is a free-lance writer based in Santa Barbara, Calif. He specializes in emerging technologies.



Mark S. Fisher

## Smoothing out the bumps

**C**harged with the care and feeding of more paved roads than any other state in the nation, the North Carolina Department of Transportation's highway division is one of the largest construction companies in the world. The state is nearing completion of its first project — an on-line highway management system that will automate the state's road maintenance program and help keep better track of records.

About 150 workstations were installed at 55 sites, along with OS/2 data servers to handle local database processing. A wide-area network connects each local-area network to an IBM 3090 mainframe, where centralized data resides in a DB2 database.

"Client/server is much more involved than it appears on the surface," said Tom Runkle, deputy state controller for information resource management. His advice? Plan for a "tremendous difference" in support levels for PCs and LANs vs. mainframes, and factor in extra time to get programmers up to speed. ■

### CONSULTANT'S VIEW

# Technological growth makes scalability a key concern

**J**ust about every week, a new client-based application development system appears on the market.

This is good news for organizations that want to begin moving the application development process from server- and character-oriented tools to a graphical client environment. The benefits of graphical application development — easier prototyping and iterative development — are becoming clear to many developers working with these tools.

But the same qualities that make development systems so useful and appealing also present potential dangers.

As organizations move out of the pilot stage with these new tools, they will begin to discover that many of these tools cannot scale upward as the size, complexity and number of users grow. Yet scalability is the one criterion that information systems management cannot afford to underestimate.

Unfortunately, it is not always easy to judge how scalable a tool will be without careful investigation. On the surface, these tools look very much alike, while under the covers there are dramatic differences.

Whether a developer begins the development process with a tool such as Microsoft Corp.'s Vi-

sual Basic or KnowledgeWare, Inc.'s ObjectView, the initial development periods will have much in common.

Even when an initial pilot project has been completed, the differences may not be apparent. Where the rubber meets the road is when business requirements dictate that an application become more complex and when large numbers of developers must work together to create a large-scale application.

Troubles with scalability can surface in various ways.

In one case, a developer who needed to build a seemingly

simple application went to a local computer store, purchased a shrink-wrapped personal development system and very quickly constructed a useful and practical application. But his glory was short-lived. Managers within the organization who had started using this application soon needed more functionality.

So the developer had a dilemma: move from Visual Basic's higher level, point-and-click environment into straight C programming or select a completely different application development system — one that could allow the application to grow from its simple roots to a complex data analysis system. While it was



Stephen Sherman

By Judith Hurwitz

**Some of the jazziest development tools cannot make the leap from small workgroup to large, complex projects.**

early enough in the process for this developer to change to a more robust tool, the situation is not always so simple.

In another case, a large manufacturing company decided to begin implementing a client/server development environment. It began with a pilot project using a popular PC-based development system, which was an excellent choice for the pilot project.

Problems rose to the surface after the initial pilot stage, however. Once the production project began, the two initial developers were joined by 30 more assigned to the project.

Because this particular tool was initially designed for small workgroups, it simply did not have the underlying structure to support as large a set of functions as the organization needed. After spending more than \$5 million, the company is now re-evaluating its tools.

How can you tell how scalable a tool really is? For starters, talk to other customers who have used the product in a large-scale development environment. Ask the vendor for more than one reference.

Find out what kind of experience the tool vendor has. If the company has done only small desktop applications, chances are it does not have the expertise for large systems work.

Make sure you can articulate your own problem. Be able to explain — in specific technical detail — what you're trying to accomplish with the application. And think ahead about growth potential. **CSJ**

Hurwitz is president of Hurwitz Consulting Group in Watertown, Mass.



# World's Largest Prosecutor's Office Adopts New Information Management System

The Los Angeles County District Attorney's Office is implementing a state-of-the-art information management system to help its 950 prosecutors handle the more than 300,000 adult and juvenile cases it tries each year more efficiently.

Under the direction of newly elected District Attorney Gil Garcetti, the head of MIS for the office, Sherron Trawick, is establishing a shared network that will increase the productivity of the prosecuting staff, enhance management information and increase information sharing with other criminal justice agencies throughout L.A. County.

Trawick reports that the success of the Prosecutor's Information Management System (PIMS) being put in place is largely due to the development of a cohesive team consisting of users, District Attorney Office management, Price Waterhouse Management Consulting Services (MCS) staff and technical staff from both the central County IS department and her IS division.

The combination of teamwork, choosing the right system and technology environment and careful implementation of the new system in incremental phases are the keys to meeting the goals set by the department.

## Setting Objectives

The complexities involved in prosecuting cases in a county as large as Los Angeles were overwhelming the old system. The environment in place was comprised of several small systems with the equipment and applications that did not interface, requiring duplicate entry of data. Ms. Trawick notes that "one of our key goals was to provide our users with the ability to do case tracking and court document generation on a single system and eliminate costly and time-consuming duplicate data entry. We needed to improve the user interface, too; what was in place was an antiquated system."

Trawick explained that in addition to an improved user interface, and a timely and inexpensive ad hoc reporting system for management, they wanted to facilitate information sharing "with the rest of the criminal justice community." The DAO was one of the few agencies in L.A. County that could not share data with the other criminal justice groups.

The critical need for such information to flow across the criminal justice system was stymied because the DAO's systems were "outmoded and our minicomputer hardware had a proprietary operating system." What was needed was a way to "automatically capture important data electronically such as booking information when a defendant is arrested and other critical court events." Along the same line, when the DA's office files a complaint, that data would be generated electronically for the courts and other criminal justice agencies.

## Choosing A Solution

When the scope of the problem was analyzed, the DA's office set about looking for help to develop a system that could provide timely information across a central office and 40 branch and area locations. It would have to provide the 950 prosecutors with current data on juvenile and adult defendants involved in the 250,000 misdemeanors, 50,000 felonies and 25,000 juvenile cases tried each year. To meet those needs, a

decision was made to develop a client/server system for the unit's operations in order to reduce processing costs and provide added flexibility. The system would also have to continue to serve the office's data and wordprocessing needs.

## Choosing The Right Vendor

Once the parameters for the new system were established, the DA's office issued a Request For a Proposal. After evaluating the vendor's RFPs, the two best were asked to present prototypes of the systems that they planned to build. After the all-day presentations and interviews to insure that the system would not only meet the specified technical demands but could also be implemented successfully, Price Waterhouse MCS was awarded the contract.

Trawick explained that the DA's office was very impressed by the way Price Waterhouse MCS "integrated data processing and wordprocessing into the system during their prototype presentation. It demonstrated a real understanding of what we wanted them to accomplish. We were convinced that they had the client/server skills required to deliver a system to meet our expectations."



A law clerk at the Los Angeles District Attorney's office prepares a crime scene diagram on his PC workstation.

## Designing The System

The first step in designing the system was to gain an understanding of the user's needs. In addition to the office automation system, Price Waterhouse MCS was confronted with the challenge of designing and implementing three key subsystems -- juvenile, adult and victim/witness programs.

Price Waterhouse's design team worked with the users during the external design phase to understand the operation and streamline it. Trawick reports that "the approach used by Price Waterhouse MCS enabled them to quickly gain a thorough understanding of our business and to make valuable recommendations regarding which procedures to keep, to change and to automate."

One of the keys to designing the system was understanding the similarities and differences between the subsystems. The juvenile and adult operations

both required document generation and case tracking. However, juvenile offenders are assigned a court case number that remains with them throughout their history with the court system and only one minor may be assigned to a case. On the other hand, with adults a new court case number is assigned every time a new case is filed and multiple defendants can be assigned to a case.

Trawick explained that the adult system "will be sending and receiving information from numerous systems used by the courts, probation department and law enforcement agencies, while, for juvenile defendants, we only receive and send data to the Juvenile Automated Index System." She indicated that "this was a far less complex system of information gathering, particularly since there are only nine juvenile offices versus 33 for adults." It was thus decided to implement the juvenile subsystem ahead of the adult.

Trawick added that another reason behind the decision was concern about the readiness of the court system interface with the adult subsystem and wiring demands in all the buildings that serve the adult program. At the same, she said, "there are components in the juvenile subsystem that will be reused in the victim/witness and adult subsystems. In effect, we're easing the ultimate implementation of three subsystems while we concentrate our efforts on bringing the first one up."

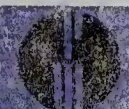
The design of the application also had to include support for the victim/witness assistance program, which has to be able to access information from both the juvenile and adult subsystems. At this time, although there is a California state system in place that tracks payments to victims and witnesses, other parts of the program are a local responsibility. Local DAO representatives require the ability to check on dates for court appearances, to arrange for transportation needs and other services available to those in the program.

## The Technology Environment

Clearly, the system is a complex one, calling for highly integrated network architecture and applications. For example, the architecture for PIMS is truly distributed. The database tables reside in DB2 on an IBM ES 9000 mainframe while the primary application programs are accessed from local file servers. The network architecture consists of Local Area Networks (LANS) connected to the County's Wide Area Router Network. SQL statements are used to transmit data from the mainframe to a file server and then a workstation where processing occurs. Information is then transmitted back to the mainframe for storage. Users are running Lotus Notes on OS/2 workstations in the office locations with servers for database, print, domain and communications.

Because it is critical that information be available for court appearances, the system designed by Price Waterhouse MCS has a great deal of built-in redundancy to take care of emergencies. For example, selected workstations can operate in a stand-alone mode when necessary to ensure that documents needed for court appearances can be printed even if the mainframe, wide area network and LANS are offline.

Continued on page 39







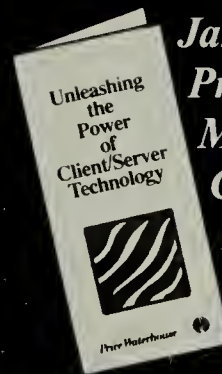


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# Reengineering Operations and Systems Brings Maritz Travel Company Increased Sales And Customer Satisfaction

The combination of organization-wide business process improvement along with state-of-the-art networking and client/server computing is helping the Maritz Travel Company (MTC) achieve higher productivity, enhance its cost effectiveness, increase data integrity and respond to customers faster and more effectively. These changes are the result of an intensive reengineering of its business and systems that began in 1992 with the assistance of Price Waterhouse Management Consulting Services (MCS).

As a result of this reengineering effort, the \$1.3 billion company is moving from a functionally driven organization with multi-layered decision-making to a client-focused team structure. To enable these major organizational changes, MTC is implementing a single, seamless data pathway network where all information driving the business is accessible over individual workstations. Although in the midst of implementation, these efforts are already bringing MTC higher productivity, enhanced cost effectiveness, increased data integrity, and speedier response to customers.

## Gearing Change To Business Needs

MTC, challenged by sagging travel demand and increasingly complex customer requirements, recognized that it needed to find ways to enhance its ability to deliver high quality, cost effective group travel. After carefully examining its options, management concluded that fundamental changes to MTC's organization, processes, and technology would be required to ensure its continued leadership in the group travel industry. As a result, it engaged Price Waterhouse MCS to help it examine and reengineer its core business processes and to identify related information technology strategies to support the organization to the year 2000.

After an in-depth analysis of MTC's core service delivery process, including product development, supplier management, sales support and marketing, a joint MTC-Price Waterhouse MCS team recommended that MTC restructure its processes, organization and technology around the client-focused concept. The team identified a need for much stronger systems to leverage the skills that previously had been maintained in the functional organization.

"Handling the movement of 2,000 business travelers to a convention or meeting site requires a high degree of coordination and flexibility," according to Scott Guerrero, Vice President Information Systems at Maritz. "It demands ready access to information, quick turnaround and no dropped balls."

## Improving Business Processes

The key to MTC's reengineering challenge was to recognize that the organization must be focused completely on meeting the group travel client's objectives. All efforts that didn't contribute to the central objective of designing, delivering, motivating and satisfying group travel programs had to be eliminated or reduced in priority. Recognizing this, the team focused on making changes that:

- Reengineered the way travel programs were designed and sold to eliminate errors and ensure client satisfaction from the outset

- Flattened the organization by eliminating an entire management layer
- Broke down functional barriers by reorganizing people into client-focused teams
- Reduced coordination and bureaucratic costs among functional groups by cross-training, redefining of job boundaries and locating staff members working on the same project in closer proximity
- Increased individual authority to make decisions that would improve client satisfaction
- Reduced non-value-added activity by streamlining specific processes such as job costing and contract administration.

## The Technology Solutions

Very early in the process MTC recognized that the radical reengineering solution that was being developed could only be successful if supported by new information technology tools.

The empowered client-focused work teams needed technology to help provide the functional linkage and support roles that traditionally had been provided by the deep functional hierarchy. This required that MTC update its non-integrated platforms and systems that had grown up over the years with integrated systems that would allow work teams to communicate between and among themselves. Guerrero highlighted that problem, noting that "what we had were fragmented islands of automation that did not integrate well and required redundant databases with increased data input which led to higher costs and errors."

MTC first focused on developing the underlying communications infrastructure, basing the network on a Sybase database, a Novell Ethernet LAN system, Compaq 486 and Macintosh workstations, Sun

Microsystem database servers and Microsoft Windows desktop applications. While the overall system rollout will take eighteen months to complete, a prototype system is already in operation in Maritz Travel's West Coast Area, according to Guerrero. "Our first objective was to replace our old wordprocessing system with the new spreadsheet and wordprocessing applications and network capabilities. The West Coast group has the ability to access data through the desktop."

Attempting to completely overhaul the IT infrastructure while implementing major organization change has been a big challenge for MTC. "Moving to a new technology requires a great deal of patience," Guerrero notes. "It entails a high learning curve and cultural change. You have to manage change by securing commitment to change, building dedicated teams and communicating to the stakeholders in the process. Accomplish that and you're home free."

## A Holistic Approach

Looking back on the project Guerrero believes that "the integration of process and information technology change into a single solution has been an important key to improving our performance." Although they are not yet "home free," MTC believes that the improvements already validate their decision to undergo the radical change process. Indeed, after only six months of implementation, MTC has been able to achieve significant productivity improvements. MTC fully expects that when the process and systems changeover is complete, the benefits of the project both in terms of increased profits and improved customer satisfaction will be even greater.

Continued on page 39



Catering to business traveler needs includes a festive cocktail party for conference participants in a beautifully decorated hotel atrium near St. Louis.



Continued from page 35

## World's Largest Prosecutor's Office Adopts New Information Management System

### Teamwork

When asked about the success of the project to date, Trawick says "we are all one team." The collaboration with Price Waterhouse MCS and the users has eased the application design process. There are, she adds, regular meetings in which the users are asked to "review everything we do and incorporate their views into the process. My staff and the County IS people all report directly to the Price Waterhouse MCS team leaders."

Rip Sanders, the Price Waterhouse partner responsible for the program, agrees that much of the success of the project is due to teamwork. "Up front we invested in a substantial amount of training for the users and County technical staff in JAD sessions, analysis techniques and technical skills so that each team member would understand their role and the skills required to carry it out. We have ensured that the DA and the County staff are involved in every major aspect of the project." The goal of Price Waterhouse MCS was to see that there is a transfer of knowledge to the DA's staff so that they will be able to continue to support the system after Price Waterhouse's role is completed.

Trawick pointed out that since her staff had worked on the systems that were being replaced, they were able to call attention to potential problem areas early in the process. This approach, she said, "will help ensure that we are building a system that meets the

user needs while limiting the amount of effort required for expensive retrofits or rework."

### Facilitating Change

By working with the users, the implementation of the new systems will be far easier. Not only did the team work "hard to ensure that the system meets user needs," Trawick says, "but prototypes were built for all three subsystems thus increasing user familiarity." The advantages of introducing users to new systems well in advance before they are in place and making them an integral part of the process is a time-honored technique for managing change.

Training is also an important part of the change to new systems. Trawick explained that her department's goal was to "make sure that the users are properly trained on the new equipment and the new environment. Our users were familiar with the 3270 character-based system. Now they have to learn how to use a mouse and become familiar with graphical interface. We also needed to teach them how to access the 3270 emulator on their PCs so we can remove their old equipment and begin integrating them into the new system."

This part of the changeover has also created problems. Trawick points out that her staff has more responsibilities now that it has to keep "two antiquated systems on line to support users as they transition to the new system." She added that "supporting every-

one, bringing on new equipment and the LAN environment has been a real hurdle to overcome."

The changeover has not only made difficult demands on the IS department, requiring a somewhat different allocation of internal staff resources, but it has affected users in many ways. For example, in addition to just learning the new system, "selected users have a new role to fill. In the past, they did not have to worry about LAN administration. Now each office has an administrator responsible for security, backups, initial troubleshooting and other LAN administration functions."

### Moving Forward

These issues raised in a changeover to client/server environments are not easy for organizations to deal with. They require skills such as those brought to the project by the Price Waterhouse MCS team. Despite the challenges, Trawick says that they will not only have the juvenile portion of the application up and running in the third quarter of 1993, but will have the adult portion on-line by the end of 1994. These will be welcome benefits.

Trawick believes that the new system will help make it possible for the DA's office, faced with substantial budget cuts, to handle a larger workload without increasing staff size. She says they are "providing our attorneys with the ability to improve job performance."

Continued from page 38

## Reengineering Operations And Systems Brings Maritz Travel Company Increased Sales And Customer Satisfaction

### Group Travel at Maritz - The Ultimate Travel Experience

Imagine sending 10,000 important customers and executives of major corporations to the Olympics over a two week period. Moving thousands of people to hundreds of events, dealing with everything from lost luggage to getting a VIP into the sold-out basketball final - an impossible job? That's what Maritz Travel Company does for a living. MTC specializes in delivering unique and carefully crafted travel experiences for clients who want to make a major impression on their customers and top performers. This involves organizational challenges that would overwhelm even the most experienced manager. For example, when a major manufacturer wanted to give 200 parts distributors a unique tour of Maui, MTC devised an intricate rental car road rally, complete with event checkpoints, special maps and prizes. While the experience was preferable to hiring six tour buses, this precision and creativity doesn't come easily. The sheer volume (over 90,000 travelers a year) and complexity of moving thousands of people to exotic destinations without a hitch places great burdens on MTC's processes and systems. Consequently, MTC is continually looking for new ways to deliver the ultimate travel experience.



MTC's new networking and client/server computing system provides quick response in client programs such as this incentive travel cruise program to Antarctica.





# USL's Tuxedo TP Monitor

## Primed for critical business use but still missing some key features

The Client/Server Journal's New Product Review is an evaluation based on interviews with major users at corporate and educational installations. The product under evaluation is being used in a production environment.

### PROS AND CONS

➡ Evaluators were pleasantly surprised by Tuxedo's performance and gave it high marks for integrity and reliability.

➡ The lack of sufficient administration and security tools made using Tuxedo more difficult for evaluators, however.

### TUXEDO 4.2 RATINGS

Ratings are based on user expectations on a 1-to-5 scale, where 1 is below expectations and 5 is above expectations. Ratings are presented in order of importance to users.

OVERALL RATING	3.5
RELIABILITY	3.8
HIGH-VOLUME PERFORMANCE	4.3
PRICE/PERFORMANCE	3.8
EASE OF USE	3.5
TECHNICAL SUPPORT	4.0
ADMINISTRATIVE SUPPORT REQUIRED	2.5
EASE OF INSTALLATION	3.8
EASE OF NETWORKING	3.5
COMPATIBILITY WITH INSTALLED SYSTEMS	3.6
INTEGRATION WITH EXISTING APPLICATIONS	4.0
HANDLING MISSION-CRITICAL APPLICATIONS	4.8
SECURITY	2.6
INTEGRATION OF DATA AND TRANSACTIONS	4.5
SCALABILITY	4.0
EASE OF DEVELOPMENT	3.5

**T**uxedo from Unix System Laboratories, Inc. (USL) provides the reliability, integrity and scalability users need and offers stronger performance than expected.

But the product remains largely unproven in large, highly distributed environments and lacks management tools. Administrators also face a stiff learning curve, according to users who reviewed the product for this evaluation.

Gaining control of transaction volume is a key concern of information systems managers. Three major players in the Unix transaction monitoring market are Tuxedo, Transarc Corp.'s Encina Monitor and NCR Corp.'s Top End. Tuxedo is the most widely used transaction monitoring software in the client/server realm, with 51% market share in 1992.

As the granddaddy of the category, Tuxedo was introduced in 1983, when Unix adherents were mostly in academia or engineering and client/server was barely a whisper in corporate boardrooms. Today, it is offered on almost all Unix systems through more than 50 resellers.

Participants in this product evaluation have extensive experience with Tuxedo in multiplatform environments. All are running production applications with Tuxedo, except the expert user, who recently switched to a non-Tuxedo company but who has many years of experience with the software.

The format for this survey was developed by Howard Rubin & Associates, and the questionnaire for Tuxedo was created with assistance from Ed Acly, director of software research at Technology Investment Strategies Corp. in Framingham, Mass.

### RELIABILITY, AVAILABILITY

The evaluators found Tuxedo to be very reliable, matching Unix's strong reliability. They attributed downtime to issues specific to their environments.

Utility: "Most of the problems that we would experience in a testing or production environment were not necessarily direct problems with the Tuxedo software as much as dealing with the configuration. Tuning the system leads to some downtime if you don't have it tuned and set up exactly correct."

Expert user: "Every time that we lost a Tuxedo — we had three running — we always found out that it was either something we'd done or we ran into a resource that we hadn't tuned properly."

### HIGH-VOLUME PERFORMANCE

Operating speed in high-volume situations was a pleasant surprise, said users who bought Tuxedo for its reliability and

tracking.

Financial services: "We chose Tuxedo more for reliability and guaranteed message delivery than performance and discovered that performance is a bonus for us. We are seeing performance gains using Oracle's relational database in that environment with multiple clients."

Utility: "Performance is at least meeting 90% of what our expectations are at high volumes. We've made some comparisons with other Unix systems that we have that do not use a transaction manager but use the process-per-terminal connection. We've seen on the order of at least 10% to 20% improvement on certain things vs. a non-transaction manager-based application."

### PRICE/PERFORMANCE

The costs to run Tuxedo are far less than to build homegrown monitors. But some evaluators

**CSJ**  
PRODUCT REVIEW



would like prices reduced further.

Financial services: "Based on what we could actually build for the cost of Tuxedo, we would not even come close. It would be roughly an order of magnitude of difference, something like \$100,000 in software licenses vs. \$1 million worth of development."

Expert user: "Part of the reason we left the mainframe world was that things cost so much and in open systems, we could move software from one platform to the other. Tuxedo is one product that we can get on nearly every platform, but I still think it's a bit pricey."

#### EASE OF USE

Overall, Tuxedo was judged easy to use, although administrators have to climb through levels of complexity beyond what they might encounter with a fourth-generation language.

Retailing: "We found it quite easy to use. There are a couple of areas that we found were not intuitively obvious. One was 'How do you handle errors at places in the Tuxedo bulletin board?'"

Utility: "If you're from a Unix C software development view, you're probably comfortable with it. But it doesn't have the next-generation kind of things we're using to make it really easy to build servers. That's why we're building interface layers on top of it for our developers."

#### TECHNICAL SUPPORT

Service and support from both USL and its resellers are good, but there are occasional problems when USL is better able to solve a problem than the resellers.

Financial services: "USL has been supportive directly. Our only problem has been with the whole-sale-to-retail channel. USL is usually a release or two ahead of everybody else."

Expert user: "We'd originally purchased the product through the retail channels but ended up dealing with USL because we wanted to get the straight scoop. Often you'll hear one thing from the retailer and something else from USL, and it may be because they were a little out of sync."

#### ADMINISTRATIVE SUPPORT

The evaluators were least happy with Tuxedo's administrative requirements. A lack of systems management tools plus the complexity of the new environment required substantial learning.

Utility: "It takes a highly skilled person to administer Tuxedo effectively — someone who is a very competent Unix administrator. The Tuxedo capabilities that they give you today haven't really changed in the last seven or eight years, so it's still rather crude. You cannot deploy it into a data center and have the existing operations people run in it. There is a lack of system management tools."

Retailing: "There are exactly three of us here who know what to do with Tuxedo. The fact that there are so few of us is a reflection that it is relatively tricky to turn this over to the people who handle more standard operations."

#### EASE OF NETWORKING

Mixing different vendors' hardware platforms on a large homogeneous network was no problem for

## USL responds

**ON PRICING** We have recently changed our pricing methodology from a machine-class pricing scheme to a user-based pricing scheme, which allows end users to pay based on use of the system.

**ON ADMINISTRATION TOOLS** Historically, USL has left the administrative and management interfaces as an area for value-add by our OEMs, which have developed quite sophisticated tools for development and management of Tuxedo-based applications. Yet the management tools available today with Tuxedo are not based on state-of-the-art, simple graphical user interfaces. We have work under way on an application-level interface for administration.

**ON LARGE DISTRIBUTED NETWORKS** USL is developing a feature called "Domains" that will make implementation of very large distributed systems simpler. Domains will allow individually managed Tuxedo Domains to be linked up and participate in a single application.

**ON SECURITY** Tuxedo provides security features today for authentication either through the Tuxedo security mechanism or by plugging in a security server such as Kerberos. USL is improving this area and plans to provide authorization capabilities integrated with Tuxedo that will support the use of access control lists. ■

Tuxedo users. The evaluators said they do have reservations, however, about using the product in heterogeneous networks that go across bridges and routers.

Utility: "One of the problems I still see with this is that it's still a fully connected network, and in our environment, we don't always want it to be a fully connected network. I think there's some basic scaling issues that they have not addressed in the product."

Expert user: "In terms of features and functionality, this thing works swell if you're on a LAN. But we had some significant issues to go through when we started to put this on a machine 300 miles away

over a T1 [line]. It was a bit more difficult than it needed to be."

#### SECURITY

The evaluators rated this area low because Tuxedo does not support some commonly used security software, and it does not integrate authentication features.

Utility: "There are basic features lacking. They've only made some cursory attempts to integrate authentication, and there are no real hooks to do any authorization in the product."

#### SCALABILITY

Tuxedo proved to be scalable — but not easily so, largely because it requires changes to all the platforms. Some of the platforms are limited by their implementation of Unix.

Retailing: "Adding processors is fine. It's a little awkward, and I do have concerns about the limits of the kernels that we're dealing with. I don't know whether we're going to run into some limits or not, but I believe there are limits to the kernels somewhere. The other problem is that if you increase the size of your bulletin board, you have to change the kernel in every machine, and that can be a problem."

— compiled by MICHAEL L. SULLIVAN-TRAINOR

### SITE PROFILES

INSTALLATION DESCRIPTIONS FOR USERS WHO EVALUATED TUXEDO

	FINANCE	RETAILING	UTILITY	EXPERT
PLATFORMS	DC, PYRAMID, HP, SUN, I486s	SUN	SUN, SEQUENT	PYRAMID
USING PREVIOUS VERSION	NO	YES	YES	YES
NUMBER OF APPLICATIONS	27	2	2	1
NUMBER OF USERS	400	ABOUT 100	250	450
APPLICATION TYPES	DISTRIBUTED ORDER ENTRY, MARKET DATA, ETC.	DATABASE FRONT END AND TESTING	CLIENT/SERVER OLTP	CENTRAL TRANSACTION SYSTEM

### TUXEDO 4.2 FEATURES

- ▶ Runs on more than 20 major platforms including MVS CICS, OS/2, AIX, VMS, Sun, Windows, DOS, Ultrix and Unix.
- ▶ Newly released gateway allows users to access mainframe data in MVS/IMS databases via TCP/IP.
- ▶ Includes high-performance naming service allowing name access to be transparent to applications users and programmers.
- ▶ Offers multiple application load balancing schemes to optimize performance.



## MULTIMEDIA MENU

- From 1992 to 1999, the worldwide market of video products is expected to grow at a rate of 4% to 20%.
- Multimedia hardware and software revenue will grow from \$7.2 billion worldwide in 1993 to \$24 billion worldwide in 1999.
- Upgrading a PC for multimedia applications can cost \$800 to \$1,200. Prices for incorporating video into applications are even higher.

Source: Market Intelligence Research Corp., Mountain View, Calif.

**RAD TECHNOLOGIES** unveiled **SCREENPLAY**, a multimedia tool used for recording, editing and playing on-line videos from Sun Microsystems, Inc. SPARCstations running Solaris.

According to the company, ScreenPlay was designed to let corporate workstation users create on-line screen videos incorporating sound, animation, drawings and text, as well as information from workstation applications.

ScreenPlay has a graphical control panel that looks similar to a VCR. This control panel helps the user create multimedia presentations with sound, animation, drawings and text.

The application is based on Microsoft Corp.'s AVI formats, so ScreenPlay videos can be converted to run under Windows. Workstations running ScreenPlay need to have an 8-bit color or gray-scale frame adapter, 16M bytes of random-access memory and a total of 24M bytes of disk space: 4M bytes for installation and 20M bytes for video capture.

The base unit price is \$895 with licensing options available for 100, 500 and unlimited viewers.

**RAD TECHNOLOGIES**, 2639 Terminal Blvd., Mountain View, Calif. 94043, (415) 940-1961.

**SYBASE, INC.** has announced **GAINMOMENTUM 2.0**, the newest release of its object-oriented, multimedia application development environment.

GainMomentum 2.0 was designed to help create easy-to-use and powerful business applications that combine text, graphics, audio and video with transaction data from SQL databases. Target applications include decision support, interactive product catalogs and command and control systems.

Developers can create, edit and link all forms of multimedia objects, access and manipulate SQL data for Sybase, DB2 and Oracle servers, script applications behavior and deploy application runtimes.

GainMomentum 2.0 runs on Unix workstation platforms under Sun Microsystems, Inc.'s Solaris, IBM's AIX and Hewlett-Packard Co.'s HP/UX operating systems.

Pricing starts at \$10,000 for a single developer license.

**SYBASE**, 6475 Christie Ave., Emeryville, Calif. 94608, (510) 596-3500.

## SQL TOOLS

**COMPUTER CORPORATION OF AMERICA (CCA)** has begun shipping **SELECT STAR**, a SQL connectivity tool used to give SQL capabilities to CCA's Model 204.

Select Star is the newest addition to CCA's Advantage Series, an integrated information management platform and application development package. The Advantage Series allows for interoperability and connectivity. Select Star, along with Horizon, the company's LU6.2 communications package, allows for peer-to-peer connectivity with Model 204.

Select Star can integrate with Windows programs through Dynamic Data Exchange, and it provides SQL commands for Windows programming.

Select Star's five-user license is \$3,975.

**COMPUTER CORPORATION OF AMERICA**, 4

Cambridge Center, Cambridge, Mass. 02142, (617) 492-8860.

**SYBASE, INC.** has announced the **SYBASE AUDIT SERVER**, an auditing tool that enhances security and enables the auditing of database activity across the network.

Company officials said the product was designed to give information managers more control over security in database server environments.

Sybase Audit Server validates and authorizes attempts to log into the SQL server system. It also captures and records all database access and allows administrators to easily extract data from the audit database.

The Sybase Audit Server works with Sybase SQL Server and Microsoft Corp.'s SQL Server. Pricing starts at \$2,500.

**SYBASE**, 6475 Christie Ave., Emeryville, Calif. 94608, (510) 596-3500.

## WINDOWS APPLICATIONS

**DUN & BRADSTREET SOFTWARE** rolled out **HR STREAM FLEX BENEFITS**, a human resources application. This application runs under Windows on the desktop, with SQL/Server database from Microsoft Corp. and Sybase, Inc. running on HP/UX and DG/UX platforms.

HR Stream Flex Benefits includes open enrollment and full modeling capabilities that allow employees to create and model their own benefits plan. The application can also download information from any human resources system to a workstation. This permits users to define limits of coverage, sources and costs.

HR Stream Flex Benefits pricing starts at \$88,000.

**D&B SOFTWARE**, 3445 Peach Tree Road NE, Atlanta, Ga. 30326, (404) 239-2000

## BILLIONS AND BILLIONS SERVED

Unix on-line transaction processing (OLTP) systems revenue is expected to grow from \$1.1 billion in 1992 to \$4.03 billion in 1996

The difference between OLTP and other application processing environments is how the system can provide the following:

- Data integrity
- Control
- Recoverability
- Performance
- Standardization

The following applications can benefit from the characteristics of OLTP:

- Order entry
- Manufacturing
- Inventory
- Distribution
- Financial accounting
- Reservations

Sources: International Data Corp., Framingham, Mass.; Datapro Information Services Group, Delran, N.J.

**MICRO FOCUS, INC.** has announced its **MICRO FOCUS TRANSACTION SYSTEM VERSION 1.1**, a multiplatform, multitasking, on-line transaction processing system. It provides a client/server and CICS application program development environment.

According to the company, the engine of the product was designed for scalability, flexibility, speed, CICS compatibility and integration with the Micro Focus Dialog System and non-CICS applications. It provides a high level of data integrity and security either on stand-alone workstations or as part of a client/server environment, company officials said.

Micro Focus transaction systems run under Unix, IBM's AIX, OS/2, DOS, Windows and Microsoft Corp.'s Windows NT. Relational database support includes Informix, Oracle, IBM Database Manager or DB2 for OS/2, Microsoft SQL Server, XDB and Gupta Corp.'s SQLBase.

Micro Focus Transaction System Version 1.1 costs \$1,250 for the first copy.

**MICRO FOCUS**, 2465 East Bayshore Road, Palo Alto, Calif. 94303, (415) 856-4161.

**HEWLETT-PACKARD CO.** has introduced **HP ENCINA/9000** and enhanced its **HP DCE/9000**, two software products that process transactions across multivendor computer systems and databases.

HP Encina/9000 is a transaction manager that provides data integrity in distributed on-line transaction processing environments. HP claims to be the first vendor offering these products for its own systems in combination with the

tools and utilities to make applications easier to develop and deploy. The transaction manager is compatible with the HP 9000 Series 800 and the HP Apollo 9000 Series 700.

The vendor also enhanced its HP DCE/9000 product to include replicated security, enhanced scalability and new management and development utilities. These features help users deploy enterprisewide Distributed Computing Environment (DCE) applications.

The HP Encina/9000 server products start at \$3,600. Client licenses start at \$150, with monitor licenses priced from \$5,500. The DCE core services are \$1,500. The DCE client licenses start at \$395.

**HEWLETT-PACKARD**, 3000 Hanover St., Palo Alto, Calif. 94340, (415) 857-1501.

**NCR CORP.** has improved its **NCR TOP END** to provide mainframe functionality for client/server environments. This open, distributed transaction processing monitor allows the integration of existing applications with applications running under open systems environments.

NCR Top End controls message distribution and manages resources to provide an enterprisewide on-line transaction processing system.

This product is available on the NCR System 3000 series and the Hewlett-Packard Co. HP 9000 series machines.

Pricing for NCR Top End starts at \$2,700.

**NCR**, 1700 South Patterson Blvd., Dayton, Ohio 45479, (513) 445-5000.

## DCE SERVER KIT

**ATRIUM TECHNOLOGIES** has released its **DISTRIBUTED COMMON SYSTEM SERVICES (DCSS)** kit, a Distributed Computing Environment (DCE) application server kit for developers of distributed applications.

DCSS is a set of DCE-based applications with features including SQL query functions, distributed access control and generic notification.

DCSS includes simple application programming interfaces and Distributed Access Control Manager Service, under which servers are given the ability to control access to protected resources.

DCSS Server Kit is priced from \$5,100 for a 20-node kit to \$160,000 for a site license.

**ATRIUM TECHNOLOGIES**, 5000 Plaza of the Lake, Suite 275, Austin, Texas 78746, (512) 328-6977.

## NOTES UTILITY

**DISTRIBUTED SYSTEMS SOLUTIONS INTERNATIONAL, INC.** has introduced **DSSI UTILITIES** for use with Lotus Development Corp.'s Notes Release 3. The utilities include Usage/Reporter, Replication/Reporter and Design/Monitor. The vendor has also released Notes mail utilities that include Time/Delivery Agent as well as Vacation/Agent.

Usage/Reporter and Replication/Reporter generate reports of Notes database and server activity and database replication histories across a network. Design/Monitor reports on changes in the design of Notes applications on any Notes server.

Time/Delivery Agent allows users to specify when a Notes mail message will be sent. Vacation/Agent allows users to automatically send an acknowledgment that the message was received, but there will not be a response until the user is back in the office.

The Usage/Reporter and Replication/Reporter cost \$995 per server, and the Design/Monitor is \$995. The mail utilities come bundled for \$995.

**DISTRIBUTED SYSTEMS SOLUTIONS INTERNATIONAL**, 31255 Cedar Valley Drive, Suite 207, Westlake Village, Calif. 91362, (818) 991-0200.



# ORACLE

# 7

The Client/Server database for  
transparently managing  
multiple server computers.



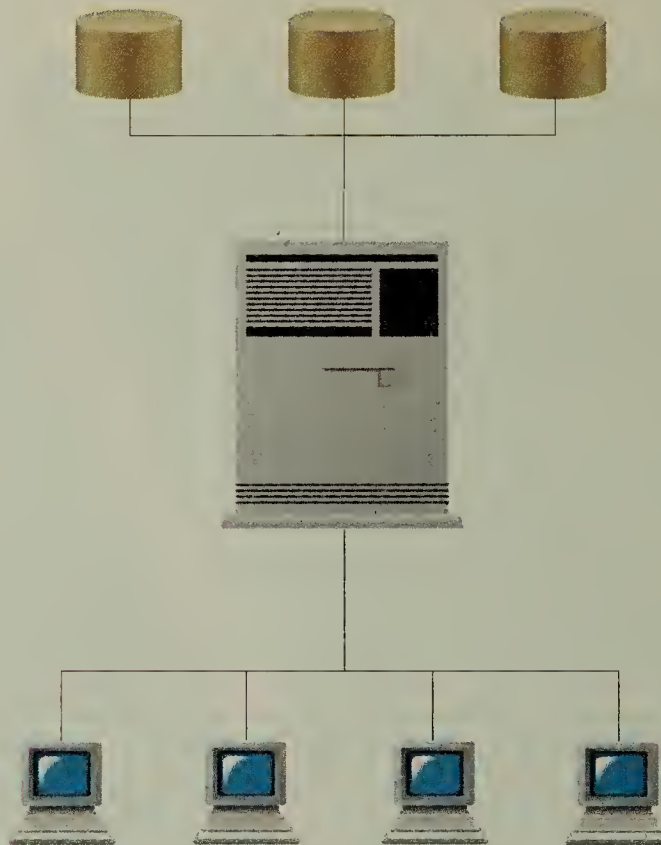
## Multi-Server Database Environment

In most organizations, information is distributed across multiple computers. This distribution of information can make accessing that information very difficult.

### First Generation Client/Server Database

Applications built using a first generation client/server database cannot access data residing on more than one server computer without a lot of extra programming. In technical terms, a first generation client/server database does not support a standard SQL query or update transaction accessing data on more than one server computer.

### Single Server Limit



SQL Query and Update can Access Data on One Server Only

### Cooperative Server Database

A cooperative server database is different from a first generation client/server database because it enables applications to access data located on multiple server computers just as if all the data were stored on a single server. That is, with a cooperative server database, a simple SQL query or update transaction works identically, regardless of whether the data is stored on one computer or on multiple computers. No extra programming is required.





## Multiple Servers



SQL Query and Update can Access Data on Multiple Servers

## Reliable, Fast, Low Cost

A cooperative server database simplifies application building and improves decision making by providing easier access to information distributed across multiple servers.

A cooperative server database running on a group of server computers offers high reliability because there is no single point of failure as there is when there is only one server in the configuration. And a group of low-cost server computers can easily outperform a database running on the largest mainframe. Specifically, the Oracle7™ cooperative server database has been certified as supporting over 10,000 users running more than 1,000 tpcA transactions per second on a pair of low cost UNIX computers. As a matter of fact, Oracle7 has recorded the fastest tpcA performance numbers ever recorded on IBM, DEC, NCR, Sun, Sequent, Pyramid, and HP.





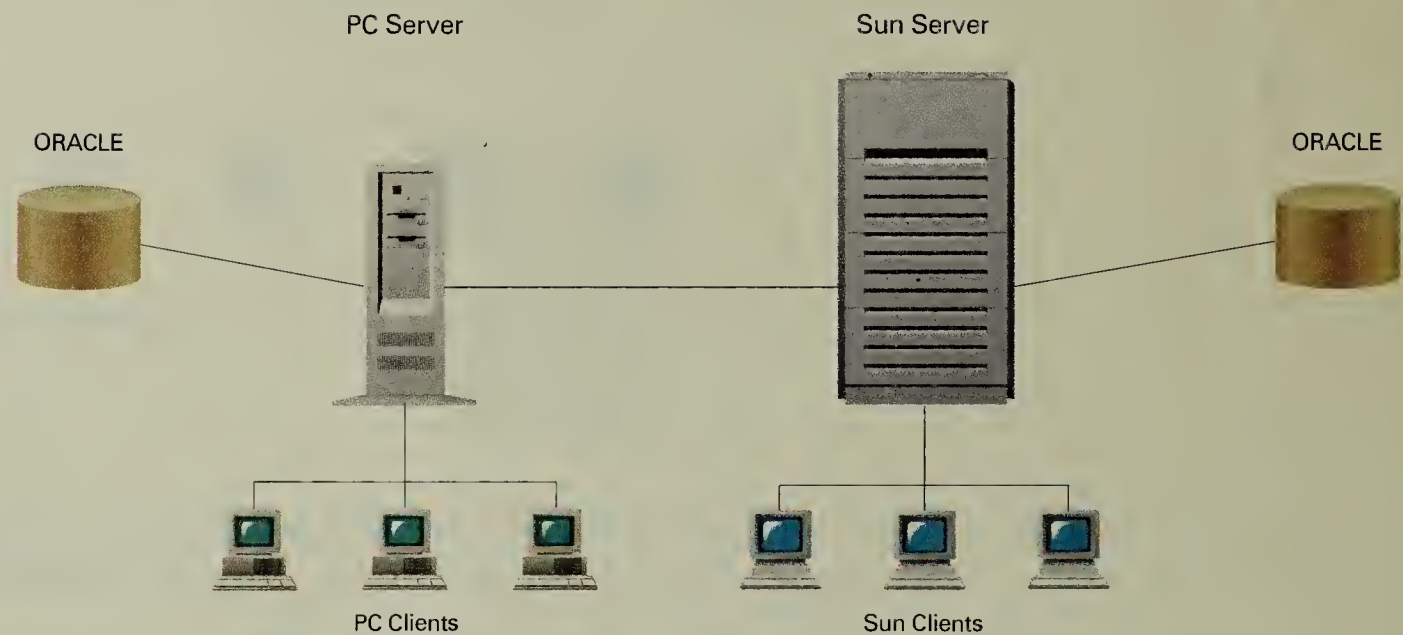
## Multi-Vendor Database Environment

Many organizations have networks made up of different types of computers: PCs, workstations, minicomputers and mainframes. The data on these computers is often stored in different types of databases from different vendors. This complexity can make it difficult to access and share information.

### Portable Database

The Oracle7 cooperative server database is portable. That is, it runs on PCs, Macs, workstations, minicomputers, mainframes and massively parallel computers. This portability gives organizations the option of running the same database software on different types of computers.

**Any Client Can  
Access Data on  
Any Server**



A single SQL query or update transaction can access data distributed across a Netware PC server running Oracle, and a UNIX Sun server running Oracle.

If your organization chooses this option, it is very easy for applications to access data stored on a network made up of different types of computers. For example, an application can retrieve or modify data distributed across a PC server and a Sun server just as if all the data were stored on a single computer.

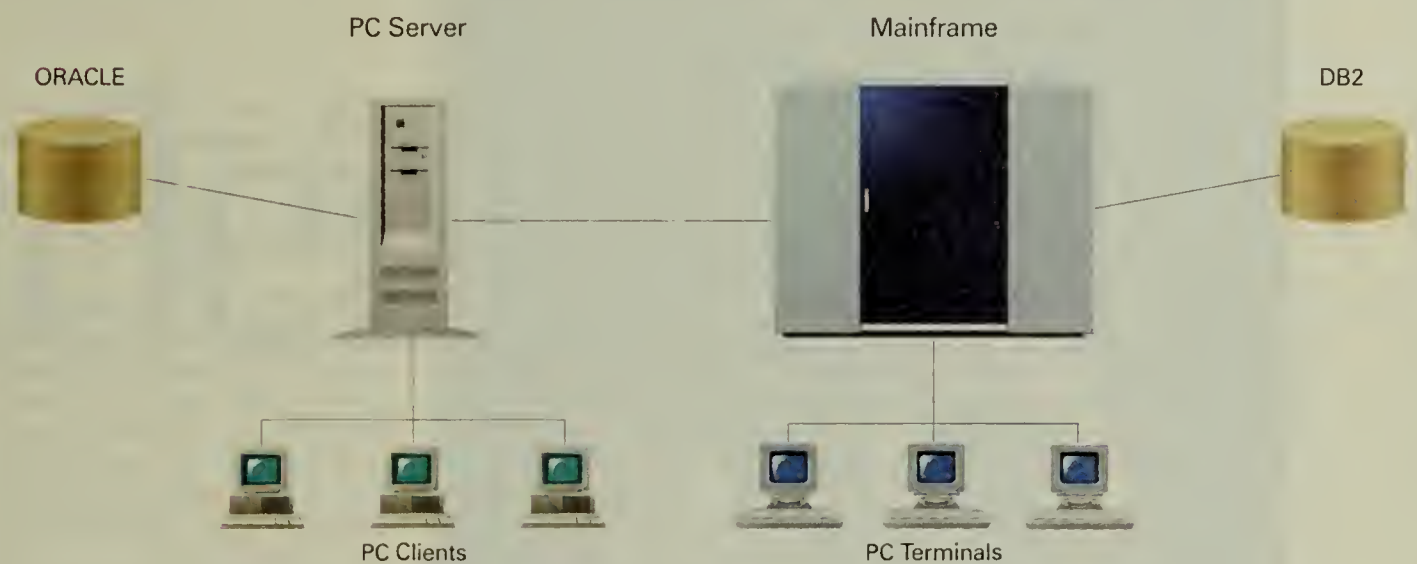




## Open Gateways

However, most organizations have data stored in different types of databases from different vendors. An open database solves this problem by providing applications with easy access to data stored in multiple vendors' databases. Oracle7 has gateways that allow applications to seamlessly access data stored in IBM's DB2, DEC's Rdb, Microsoft's SQL Server, and any other database. These gateways allow applications access to non-Oracle data in exactly the same way and with the same ease as if all the data were stored in an Oracle7 database. For example, Oracle7's gateways enable a simple SQL query or update transaction to retrieve or modify data stored partially in an Oracle7 database residing on a PC server, and partially in a DB2 database residing on a mainframe.

**An Open Database  
Enables an Application  
to Access Data Stored in  
Different Vendors'  
Databases**



A single SQL query or update transaction can access data distributed across a Netware PC server running Oracle and an IBM mainframe running DB2.

The Oracle7 cooperative server database is both open and portable. This enables applications to access data stored in different types of databases on different types of computers just as if all the data were stored in one database on one computer. In this way, a cooperative server database hides network complexity, making access to distributed information easier.

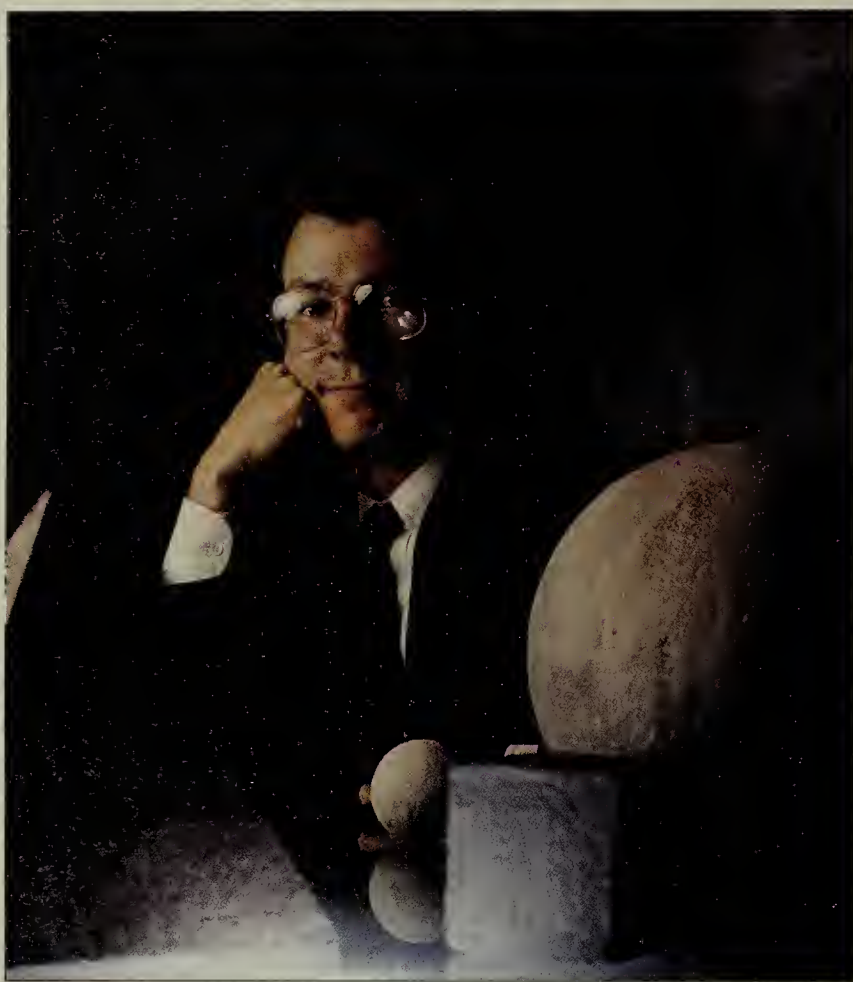
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# NO TROUBLE FOR TRIBBLE



◆ **BUD TRIBBLE:** *It takes a while to 'get it' with OOP*

In one of the classic *Star Trek* episodes, "The Trouble with Tribbles," the Starship Enterprise is overrun by lovable furry creatures that multiply at an alarming rate. Now imagine all those Tribbles as objects proliferating on company networks, and meet a different kind of Tribble: Guy "Bud" Tribble, vice president of end-user software at SunSoft, Inc. Once headed for a medical research career in neurophysiology, Tribble veered off course when a friend persuaded him to join a start-up called Apple Computer, Inc. He became one of the original software developers for the Macintosh and later a key architect of Next, Inc.'s NextStep operating system.

**CSJ** Why did you move to Sun, Next's archrival?

**TRIBBLE** I ended up becoming very interested in Sun's direction, which has always been aimed at solving the problems of distributed computing. From the start, Sun was focused on using the network as the computer.

**CSJ** Do you believe NextStep will be successful on the Intel Corp. platform, or will PC users find it too complex?

**TRIBBLE** Whatever that answer is, it's probably the same one for Solaris [Sun's Unix operating system]. There's a real challenge there. If any of these [32-bit advanced desktop operating] systems are going to be widely deployed on lots of desktops, we clearly have to get to the point where the user's main job is not learning how to use the computer.

**CSJ** What about programmer retraining in object technology? Doesn't that present a fairly steep learning curve for most MIS organizations?

**TRIBBLE** It's very analogous to the time when people programmed in Assembly language. They had to then learn Fortran or Cobol as a higher level language, and there's definitely training involved. But once you go through that, the productivity increase is tremendous.

It takes a while to 'get it' with object-oriented programming [OOP]. You can take someone from the procedural world and teach them OOP, but the first programs they write will still look and feel procedural in style. You won't get the benefits of the higher level language until you make the mind shift.

**CSJ** Is there a simple way to envision that mind shift?

**TRIBBLE** Imagine that you're cooking a cake. You can make it from scratch, from a recipe, by assembling a list of ingredients and following the directions step by step. That's procedural programming.

In the object-oriented world, you don't think about cooking as a sequence of steps.

You think about it as a package of cake mix, a cup of water, a bowl and an oven. It seems to be pretty obvious what you do with those elements.

**CSJ** How does object technology tie into client/server computing?

**TRIBBLE** It ties in with the productivity increases that will come from network-transparent programming. If I want to write a client/server application today, I have to write it using Sockets or RPCs [remote procedure calls] or one of a variety of very low-level networking protocols. It's not transparent at all. In the object-oriented paradigm, my program is made up of messages that get sent between objects, so having that application become a distributed application is much easier.

**CSJ** What do you think of the current state of object-oriented tools?

**TRIBBLE** Most of those are still in their infancy. On the other hand, I don't think the major benefit for object-oriented programming will necessarily come through the tools. They will make life better but they won't cause the paradigm shift that brings about an order of magnitude change in productivity.

**CSJ** What will cause that?

**TRIBBLE** That's going to come with the switch from procedural to object-oriented programming. The developers themselves will drive this issue. When you start seeing examples of deployed applications that get to market that much faster, or MIS shops able to satisfy their CEOs that much quicker, then you'll find that the process of acceptance will accelerate.

**CSJ** Do you have any advice on buying object-oriented tools today?

**TRIBBLE** Consider the C++ language a foregone conclusion at this point. Also, think about how the object-oriented computing you're doing fits into networked applications. Keep up with the Object Management Group's [OMG] work, and watch for standards compliance with OMG.

**CSJ** How does Sun differentiate itself from the other vendors — such as Apple, IBM and Microsoft — in object technology?

**TRIBBLE** It's a matter of believing that client/server distributed computing is an important center of gravity. [Those companies] have not chosen to concentrate on distributed computing as being central to their paradigm.

— Interview by MARYFRAN JOHNSON



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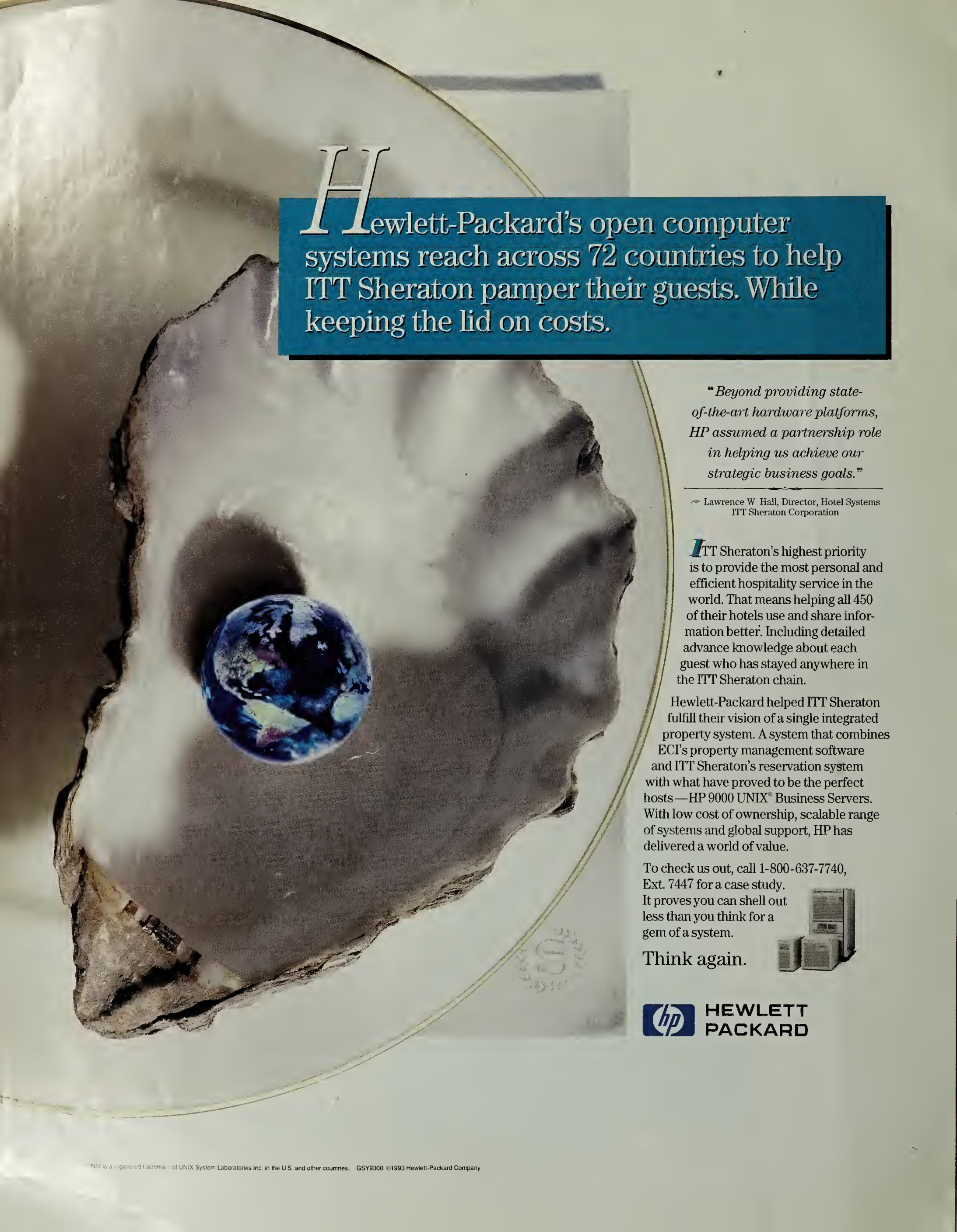
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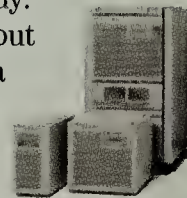
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